COMPOSITIONAL TECHNIQUES IN THE MUSIC OF STOCKHAUSEN

(1951 - 1970)

by

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SUMMARY

The aim of this thesis is not to provide a series of full-scale analyses of Stockhausen's compositions. The approach adopted herein arose out of the present writer's desire to understand more about the ways in which a major contemporary composer creates his music. Therefore, the convention assumed has been one of tracing the evolution of the several processes at work within the composer's music.

The organization of material employed is bi-partite. The first chapter contains the various noumena adopted by Stockhausen between 1952 and 1970 in a chronological sense; starting with set-theory and closing with its descendant - the mantra. Compositions are mentioned and considered in this chapter only in so far as they may be used as paradigms for the particular noumenon under examination. The second chapter discusses each indivivual work from Kreuzspiel to Mantra. This enquiry is most definitely not mere ontological speculation: rather it is intended to be a rational examination of those compositions (or parts thereof), which may further illustrate the various procedures adopted by Stockhausen in writing his music. This might consist of tracing the permutation of the set-aggregates throughout Kreuzspiel, giving an account of the innovatory techniques adopted in Momente or, in the case of certain process and electronic scores, referring the reader to the scores in which the composer has discussed the works to such a degree as to render further deliberation superfluous!

Whenever there has been an accurate treatment of any of Stockhausen's compositions (whether by the composer or other authors), the present writer has not reproduced these - he has suggested that the reader might consult the appropriate reference to find the information: in certain cases, especially Klavierstück I and Kontakte, the present

writer only discovered other analyses after preparing his own: these he has left in.

Following a brief postscript there are several appendices. The first of these discusses those works written by Stockhausen since Mantra: these were not included in the main body of the thesis since the lack of easily obtainable scores would have rendered any discourse subjective in the extreme (this appendix also covers those works composed prior to Kreuzspiel). The second considers the use of inserts in Momente which would have been too long for a footnote in the second chapter. The third illustrates a point raised in the opening chapter, the fourth is a calendar of the life of Stockhausen. The fifth and sixth are bibliographies and discography respectively.

All material already in print has been fully referenced in the foot-notes: if any acknowledgement has been omitted the present writer apologizes most sincerely, and will rectify these in future.

CHAPTER ONE

A chronological survey of the processes adopted in the composer's music.

Before considering the application of the various forms which Stockhausen developed and invented it is necessary to consider these formal techniques in sequence.

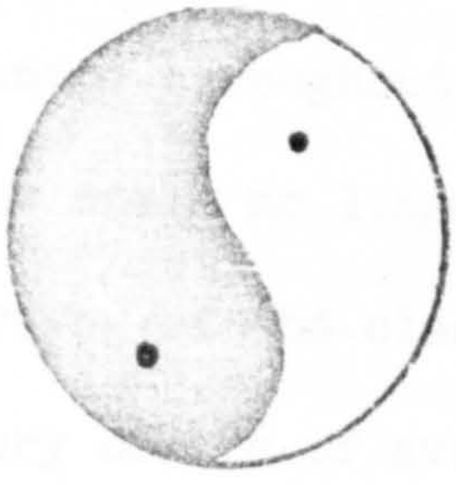
1.1 Set

Prior to discussing Stockhausen's personal approach to composition with a set it is imperative that the philosophical concept of the set is realized. It is undeniable that to create a piece of music in any given idiom, whether it be in the style of a late sixteenth century mass-movement or using a set, the composer must be in complete empathy with all the various procedures typical of that method; he must so encompass himself in that technique that it becomes part of his unconscious thought process.

The noumenon of the set is a mediation between two discrete determined limits, that is to say that the set consists of several events which occur within a given range. Analogous to this concept is the ancient Chinese archetype - the Ying-Yang, (Example 1.1.1) which represents the caesura between any two dichotomous ideals.

Example 1.1.1

(Ying-Yang)



If, on the more mundane level, this is taken to stand for the scission betwen hard and soft minerals, such as diamond and talc, then, using the philosophy of the set, it is possible to establish a scale of degrees of hardness between diamond and talc.[1] From this scale

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[1] This was done by the German mineralogist Möh in 1820

(Example 1.1.2) it is self-evident that the softness of talc is not diametrically opposed to the hardness of diamond, but simply a different degree of hardness.

Example 1.1.2

(Möh's scale of hardness of minerals)

Mineral	Hardness
Talc	1
Gypsum	2
Calcite	3
Fluorite	4
Apatite	5
Orthoclase Feldspar	6
Quartz	7
Topaz	8
Corundum	9
Diamond	10

It follows that one could select minerals by their hardness to create an extremely smooth transition from talc upwards, or select very few, in which case the transformation would be achieved in a discontinuous fashion. If the ten minerals in example 1.1.2, which occur at proportionately equal distances throughout the scale, are permutated into a new sequence then the scale no longer exists: a "set" has been established. This overturning of the classic ideal of a dualistic universe has lain at the very centre of avant-garde thought since the end of the nineteenth century, with such figures as Debussy, Schönberg, Webern, Joyce, Mallarmé, Pinter, Kandinsky, Klee, Feininger and Jawlensky.

Thus it follows that the basic principle is one of organization which involves two stages. Firstly a scale within two limits is established, then a set is devised which possesses specific proportions

which will apply throughout the entire duration of the composition and which will characterize the whole work.

In order that all the parameters may be equal it is necessary to devise some means of deploying each facet in such a way that not one is preëminent. This may readily be demonstrated by attempting to establish a system in which organized time (in its various aspects of metre and rhythm) and organized pitch (whether vertically or horizontally) are balanced. After many attempts at this it becomes obvious that this may only be achieved when the whole work is completed.

Following on from the previous paragraph it may be asserted that nowadays the application of the set to formal procedures covers all those parameters that are susceptible to organization. These parameters may be itemized as:-

pitch
duration
attack/decay
dynamic
timbre
orientation
time of occurrence

To write a pitch-set is extremely easy due to the universal existence of the chromatic scale in western music: in this way sets with twelve different pitches,may be established. Of course, if octave transposition is also considered, then there are approximately one hundred pitches to choose from, which logically implies sets with up to one hundred different pitches. Duration presents far less opportunity for selection: there are only some fifty traditional rhythms which are available to the composer. Attack/decay and dynamic present a further eight or nine possibilities, timbre somewhat more and orientation and time of occurrence only one each. (Of course, all the preceeding are only to be applied

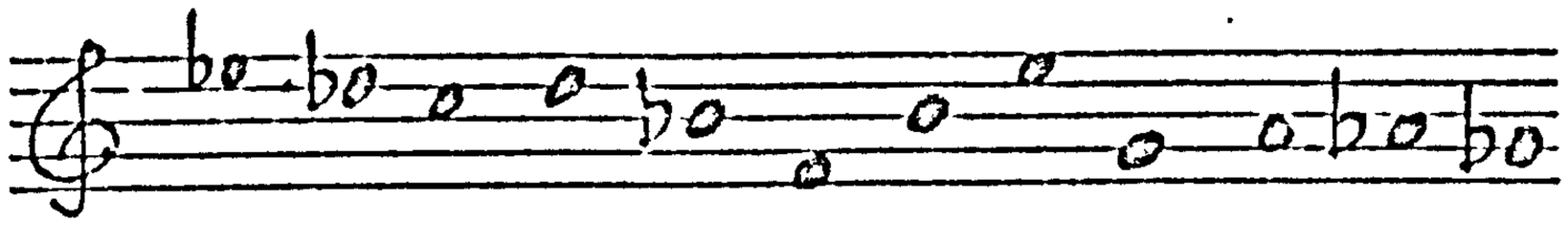
in the traditional sense.) It is perfectly possible to train the ear to detect finer intervals of pitch such as quarter and sixth tones, as used by composers such as Ives and Hába; similarly it is possible to detect a larger range of dynamic intensities or timbres, the production of which may only be possible with the utilization of a synthesizer.

In 1951 Stockhausen wrote Kreuzspiel (nr. 1/7)[2] which makes use of three utterly different sets, one each for pitch, duration and dynamic. Each of these sets has twelve members, but they are created under different conditions. The pitch set is derived from the chromatic scale in the traditional sense. The duration set is merely an additive sequence of sixteenth notes, or triplet sixteenth notes. The dynamic set, which also uses traditional notation is subjective in the extreme using only seven symbols, and is obviously subjective, whether from the point of view of the composer, performer or listener. (Example 1.1.3).

Example 1.1.3

Sets used in Kreuzspiel

Pitch



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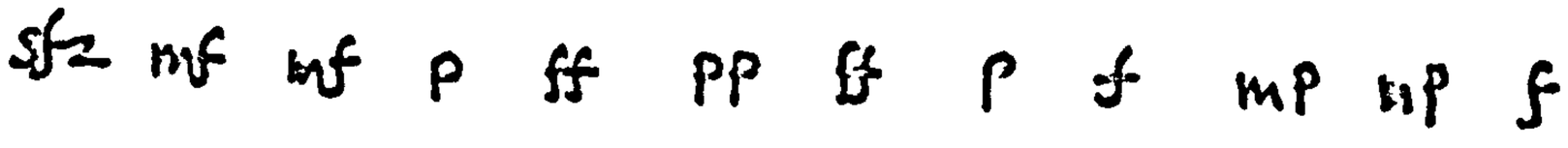
[2] for a full treatment of Kreuzspiel see p. 38

Duration

Dynamic



It was with electronic music that Stockhausen realized that all parameters could have the same scale of proportion, though the first composition to use such a universal set of proportions was Kontra-Punkte nr. 1, composed during the period 1952 to 1953. Within this composition Stockhausen uses a further technique, that of the transformation-potential set in which several different degrees of transformation imposed simultaneously upon the various parameters form a single potential.[3] Hence, an invariable transformation-potential may exist over a section of a composition in which transformation of individual parameters may

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[3] Stockhausen: Life and Work: Karl H. Wörner (1973) p. 88

occur from event to event. For example,[4] given a scale of transformation of six, then the following three events might occur in sequence:-

First event	Transformation degree 6 for pitch
	All other parameters constant
Second event	Transformation degree 3 for pitch
	Transformation degree 1 for duration
	Transformation degree 1 for dynamic
	Transformation degree 1 for timbre
	All other parameters constant
Third event	Transformation degree 2 for pitch
	Transformation degree 3 for duration
	Transformation degree 1 for attack
	All other parameters constant

Therefore it follows that within the field of set-composition Stockhausen has created a system whereby all parameters may have the same scale of proportions (the universal set), and also formulated the principle of the transformation-potential set.

1.2 Point-field

Before proceeding with an exegesis upon the development of the point-field it is necessary to define pointillist and give a brief account of its evolution.

As far as may be established the first use of the word pointillist was by Doctor Herbert Eimart in Cologne during the summer of 1951 to describe the technique used by Olivier Messiaen in his Quatrième Étude.

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[4] The example of transformation is similar to that in Wörner's book (vide supra).

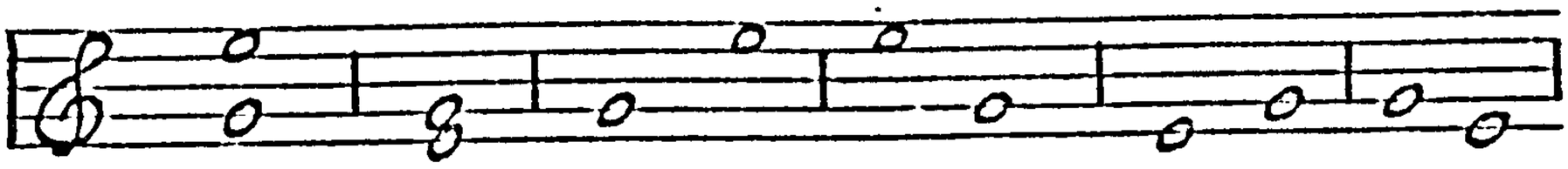
This technique is to allow each note in a complex of sound to exist in complete isolation. The note possesses its own pitch, duration, attack, etc., and is composed for its own sake - completely free from any outside influence, that is to say that although its parameters might have been assigned from sets it is not inherently dependent on any other note. Naturally, with repeated listening to such a piece it is possible to aurally discern the appearance of each note as a special event. As will be shown later on in this chapter (section 4), pointillism is one extreme of the whole gamut of musical experience, the other being the statistical approach; the limit of pointillism being reached when there is such a transparent sonority that one's attention is drawn to each individual note by turn.

It is imperative to stress the difference between pointillist and point-field, although the lower limit of the point-field is pointillist. In the former, the pointillist definition of pitch is an exact number of herz. If, instead of a "point" there is established a point-field, then, immediately, it follows that the pitch must now be defined as a band with given upper and lower limits. Hence, whereas the relationship between two points can be defined with great precision, the connection between two point-fields can only be stated with varying degrees of accuracy.

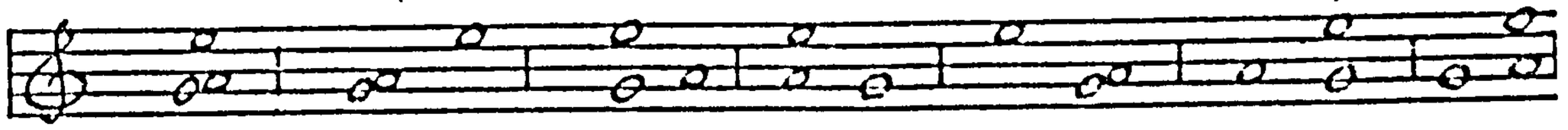
As is self-evident, form, in its basic sense, is merely the process of distinguishing between the different degrees of a musical event. If this is applied on the micro-scale then it is obviously possible to have "form" between two or three notes, whether vertically, as diad or triad, or horizontally, as a "melody" or, indeed, in combination. (Example 1.2.1). For the notes to exist at all there must be a passage of time. The number of events in that duration (i.e. the density) must now be taken into consideration. Between the two limits of the very

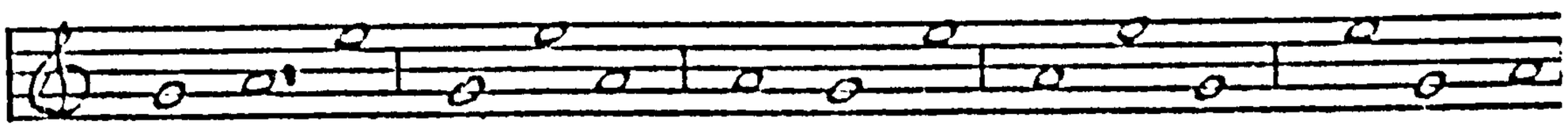
Example 1.2.1

Two notes



Three notes





small (in which there are very few events occurring during a long passage of time) and the very large (in which there are many events taking place in a short length of time) there lies an infinite number of different nuances of density. Thus a scale of density must be created along with scales of register (bands with widths of two, three, four octaves ...; high pitches, low pitches, a combination of high and low pitches ...; bandwidths of 50 Hz, 100 Hz, 200 Hz, 400 Hz ...), dynamic, attack/decay, etc.

Reapplying this principle on the macro-scale involves taking into consideration the comprehensive formal structure - for example, the interfluent result of closed and open forms would be some sort of hybrid structuration. Within the overall form there will be times of greater aggregation and greater diffusion, fields in which the predominant attack is legato or staccato, fields with preëminent sforzandi or fields of dynamic equality. These macro-scale formal differentiations arise as the result of synchronous superimposition of diverse sets and subsets. They are not the formal subdivisions that Stockhausen's predecessors would recognize.

1.3 Group

Having already discussed the formal principle of point-field it is necessary to consider the path which Stockhausen's formal approach took to reach the synoptic group. This is relatively simple: the point-field cell is an isolated note - an autarchic whole; if the formal unit is larger than this (i.e. by organizing several notes with similar intrinsic qualities) then it may be termed a group. Naturally the principle of composing with sets may be applied to both the individual notes and the inter-group relationships - by a modified application of the transformation-potential set theory. It thus follows that there are a vast number of probable ways of distinguishing group from group.

There are two chief ways of determining the relationships between the groups, both of which rely, in some form or another, on the utilization of a proportional set.

Firstly, groups may be characterized in qualitative terms. An hierarchical scale may be set up, within which it would be possible to arrange the groups in an order of preëminence - from the most predominant down to the least significant. This method of group discrimination is insensitive to quantitative definition and can only be realized qualitatively. Within this qualitative assessment it is necessary to consider both the experience and sensitivity of the composer. Composition for Stockhausen at least entails placing elements in affinity with each other, not merely to contrast and compare. As has been stressed previously, Stockhausen needs to qualitatively assess the various properties applicable to individual elements and to weigh these against each other in larger and larger units until the final balanced whole is reached. For instance, if the groups are to be equally predominant in one section of a piece, how may the composer juxtapose a very soft group with an extremely loud one without letting one or the other come across

as the more significant of the two? It is simple to suggest:-

"could one not allow a longer time for the softer one"[5]

but far harder to actually achieve this.[6]

Secondly, and more simply, groups may be distinguished in quantitative terms if all the intrinsic characteristics that are used to differentiate between isolated notes are reapplied to discriminate between individual groups. This may be done, for instance, by applying a proportional set to the number of notes in each group, or to the duration of each group, or to the overall dynamic intensity present in each group, or to the timbral quality of each group, etc. Hence, if the number of notes is constant then the other parameters may be varied.

It follows from the preceding paragraphs that to successfully compose using groups it is absolutely necessary to be able to reach an arbitrary compromise between the two noumena of conformation and shape. Implicit within the concept of conformation are the idealities of homogeneity and orthodoxy, whilst shape represents heterogeneity and disunity; as Paul Klee, the Swiss painter and sometime Professor at the Bauhaus, wrote:

"Shape is singular, monadic; conformation is plural, based on scission and reiteration."[7]

In general, conformation is detected where repetition occurs, and shape is encountered when immutable assymetrical structures are present.

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5 Stockhausen: Life and Work: Karl H. Wörner - p. 93

6 an example of this may be found in the discussion of Gruppen, pps. 107-121

7 Das bildnerisches Denken, p. 237 et seq.

Before reasserting the basic fundamentals of the group it is logical that the problems of organization be considered; this must be done as it is the organization of the elements that make up the music, whether it be sets, groups or even the sonata principle. An apt analogy would be to consider an office-block which, when viewed orthogonally from a distance, appears as a rectangular box. As one approaches it is possible to discern irregularities in texture which resolve into doors and windows. Further in, the furniture within the individual offices may be seen, whether it be tables, chairs or book shelves. Even closer and the separate books and titles become visible; if one of these is viewed through a microscope the grain and structure of the ink become visible; further examination would render visible molecules, atoms, neutrons and ever on down to the smallest indivisible particle. Therefore, to apply the above allegory to the question in hand, it is possible to directly observe the distinguishing features of the different levels of organization. If this analogy is rephrased in musical terms it is possible to imagine a form in which the most defined experience is a complex of notes within which it will be impossible to distinguish the individual notes themselves.

Probably the easiest way of summing up the basic properties of the group is to itemize them:-

1.. The noumenon of the group is a compromise between shape and conformation.

2. The limit of shape is reached as the group maps the least number of elements in a simple unrepeated order, that is to say as it becomes more and more

3. The limit of conformation is reached when the separation of the elements in the group is sufficient for it to take on characteristics of other neighbouring groups.

4. From statements 2 and 3 prec e ding it follows that a series of groups may be established, which may themselves form a super-group. To take this to its limit would eventually produce a group which would embrace the whole composition and which would be, in effect, the form of that work.

1.4 Statistical form-structure (blocks)

Concurrent with his development of the group Stockhausen felt drawn towards that branch of mathematical organization known as statistics. The utilization of statistical methods to generate musical compositions was not the sole prerogative of Stockhausen. Varèse had utilized statistics some twenty years previously and Xenakis has been (and still is) making great use with it.[8]

The idea of statistical form and its application by Stockhausen to musical composition may be expressed in two ways. The first of these, analogous to the results of surveys made by such bodies as National Opinion Poll and Gallup Poll, has the aural effect of presenting an experience within which it is impossible to detect groups, point-fields or individual elements. Stockhausen sets up within a composition certain statistical criteria, and it is from these that he creates the individual elements. For instance, if a particular event were to have the

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[8] Formalized Music: Iannis Xenakis (1971)

over-riding dynamic intensity of pianissimo, then this does not imply that throughout the complex the dynamic intensity will never rise above pianissimo, merely that pianissimo will occur with the greatest frequency of any dynamic; most of which will be concentrated in the range between piano/pianissimo and piano/mezzopiano. Indeed the presence of the occasional sforzando will serve to emphasize the low dynamic intensity rather than destroy it.

The second is really quite simple. After listening to a relatively extensive section of Die Götterdämmerung, say about a quarter of an hour in duration, it is possible to iterate several aspects of Wagner's use of leitmotives, orchestration, etc. However, only an anylysis of that section, with reference to the whole of Das Ring des Nibelungen, would produce the intellectual desiderata without which a full comprehension of the extract would be incomplete. Statistical analysis selects only those criteria which are important (just as composing with statistical methods involves primarily establishing the overall structure of the blocks.) For instance the overall effect of sections of Sirènes (nr. 3 of Nocturnes) by Debussy is of a sensual calmness, whereas the internal structure, be it just rhythmical, is rather complicated.[9] This idea of conceiving music in whole blocks rather than in individual notes is novel: it creates the absurdly simple from the seemingly complex. This naturally implies such possibilities as the interchanging of parameters within a particular block. Obviously this must be approached from a statistical point of view: the denser the block the higher the degree of synonymity between the individual component parts. A comparison between the performance of the two arpeggios in Example 1.4.1

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[9] particularly bars 26 to 33 inclusive

will prove the point. In the first, taken from the beginning of the first movement of Beethoven's piano sonata in d, op. 31(2), each individual note is heard as such in the building up of the $\frac{6}{3}$-chord.[10] In the second, taken from the first movement of Mozart's piano sonata in a,

Example 1.4.1

K. 310, (bar 22) the complex of notes is heard purely as a colouring to the $\frac{5}{3}$-chord. The over-riding criterion in both these examples being one of tempo indication. Just as the arpeggio (Example 1.4.1.b) is a colour of pitches, then the rhythmic complexities of bars 26 to 33 from Sirènes may be considered as rhythm-colour. Similarly the orchestration of Colours (Changing chords or Summer Morning by a Lake), the third of Arnold Schönberg's Five orchestral pieces, op 16, has become known as the prime example of klangfarbenmelodie, first proposed in that composer's own treatise entitled Harmonielehre (1911).

In his article ... wie die Zeit vergeht ...[11] Stockhausen expounds his theories regarding the two regions of time phases known as duration and pitch. If the complete spectrum is divided into three sections then duration must be subdivided to give rhythm and form. The region of pitch (aurally perceptible sound of definite frequency) lies

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[10] an even better example, though not notated as an arpeggio, is bars 93 to 98 from the same movement.

[11] Die Reihe, volume III, p 119. (published 1957)

within the approximate range 4.2 kHz to 30 Hz, that of rhythm from 30 Hz to 10^{-1} Hz and that of form from 5.10^{-1} Hz to 10^{-3}Hz.[12 a,b] As Stockhausen mentions, it is interesting that the limits of each region are roughly the same - corresponding to seven or eight octaves. As mentioned in the opening of section 2 of this chapter, it is certainly acceptable to consider the pointillist and statistical as two extremes. This may be demonstrated by recording a piece of pointillist music and then playing it back faster and faster. As the music becomes more concentrated so individual parameters, when applied to isolated notes, cease to have much significance: they begin to require consideration from the statistical point of view; that is to say the main overall alignment(s) of the parameter becomes of prime importance. For instance, speeding up the last section of the last movement of Webern's Piano Variations, op. 27, would result in a very strong emphasis on three bands of pitch.[13] Or, alternatively, accelerating Ravel's Bolero would produce a dynamic intensity collocation from very soft to very loud.[14] Further, since a scale[15] may be established between the statistical and pointillist limits it follows that the noumenon of the group must lie

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[12a] Naturally form may be created with greater duration than 15 to 20 minutes; the problem is as to whether this form will be appreciable in an aural sense.

[12b] Texte, Band I: Einheit der musikalischen Zeit, p. 216

[13] see Appendix Three

[14] The prime example of this whole argument in Stockhausen's output is Piano-piece XI (see page 121).

[15] see Gruppen (p. 107), Zeitmasze (p. 99) and Klavierstucke V-X (p. 83)

midway between the two. It will be located at that point at which it is still possible to distinguish the specific as having a separate identity from the surrounding corpus of material.

Before proceeding to a discussion of the ideas and techniques behind variable-form-structure it is worth mentioning that this trend towards concentrating upon the use of blocks of sound as the monadic units in the structuring of a composition clearly presages, at least in hindsight, the arrival of aleatoric processes to disrupt the total determinacy hitherto considered the norm.

1.5 Variable-form-structure

Throughout the entire corpus of musical interpretation two elements, when given at all, have always been specified in an approximate sense - as lying within a given <u>field</u>. These two parameters are those of dynamic intensity and tempo. Dynamic intensity has very few fields which may be specified;[16] they depend to a great extent on their location within the composition. Tempo similarly: even after the invention of a precise form of regulation by Loulié in 1696 composers and performers have taken great liberties in their interpretation of these indications. For instance, witness the number of different interpretations of the incredible metronome marking of the first movement from Beethoven's piano sonata in B♭, op 106, (♩equals 138). This element of variability may be introduced into the group-parameter of density - as, for instance, with the marking to play a group of pitches "as fast as possible". (Example 1.51)

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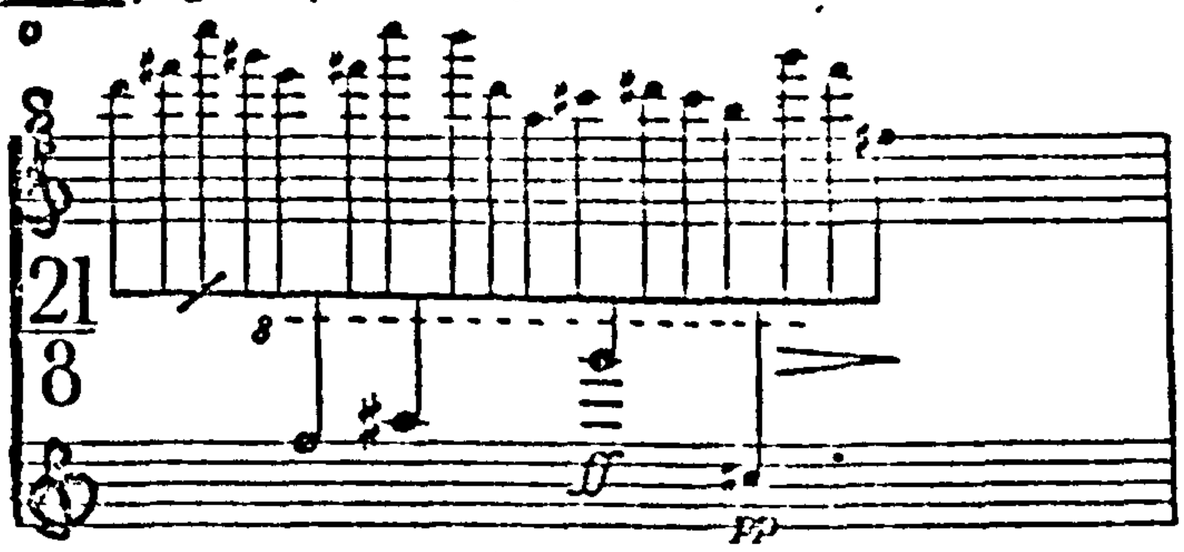
16 from pppp to ffff there are only ten fields, of which six or seven are in common usage. (sfz etc. being excluded as they are inherently attack/decays).

Example 1.5.1

(Klavierstuck IX, p. 6, bar 5)



As Stockhausen specifies in the notes to the piano pieces[17] the interpretation of "so schnell wie möglich" is dependent upon register and intervallic relationship since all notes must be articulated clearly. Within the music written during the past eighteen years there has been a tendency to "compose out" the concept of interpretation. Instead of specifying "as fast as possible" the composer has preferred to particularize an exact length of time in which the note/aggregation of notes should be played (Example 1.5.2). This has rendered a far greater choice

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17 [Kleine] Noten sind unabhänging von vorgeschriebenen Temposchwankungen "so schnell wie möglich". [Sie sind genau so wichtig wie grosse Noten;] sie sollen deutlich artikuliert, nicht quasi arpeggiert sein. Darum müssen sie in den tieferen Lagen langsamer als in den höheren gespielt werden. Die verschieden grossen Intervallsprünge in den Gruppen [kleiner] Noten sollen eine Differenzierung der effektiven Einsatzabstände bewirken (nicht egalisieren).

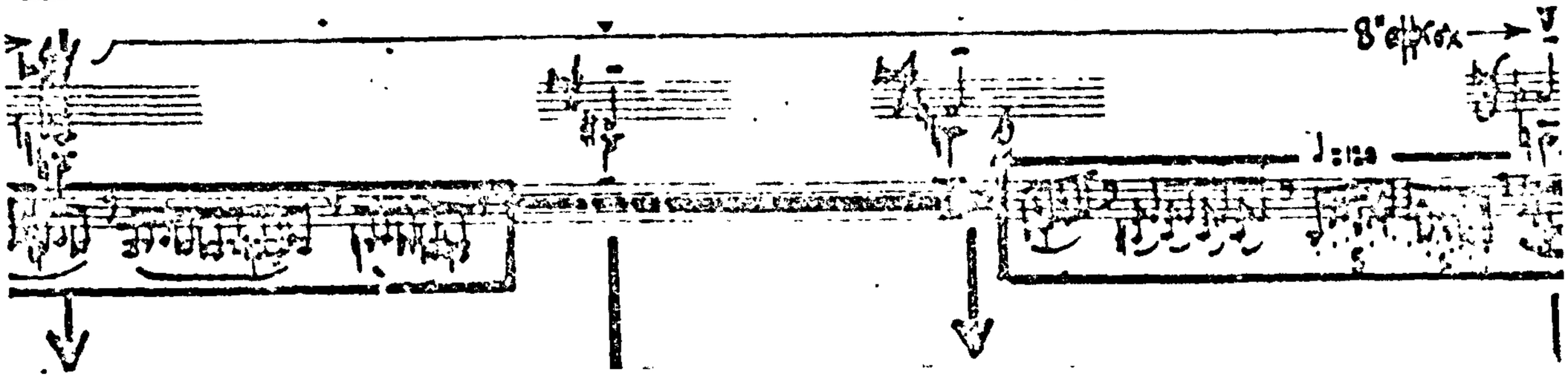
Notes are independent of the variations in the indications of tempo and are to be played "as fast as possible". They should be clearly articulated and not quasi arpeggiated. Thus they ought to be played slower in the lower registers than in the upper. The various intervallic leaps in the note-groups should create a differentiation in the actual intervals of entry (they must not be made equal).

(text within square brackets not translated)

of performance (within the composer's wishes) possible than was available by interpretation since the composer is now responsible for imposing the limits upon the degree of variability. If this technique is further extended to pitch, then the familiar "box" (Example 1.5.3) is encountered as one possible way of presenting the performer with a specific number of notes to be interpreted within a given duration (dynamic intensity etc being stated if so required). If instead of a specific number of notes

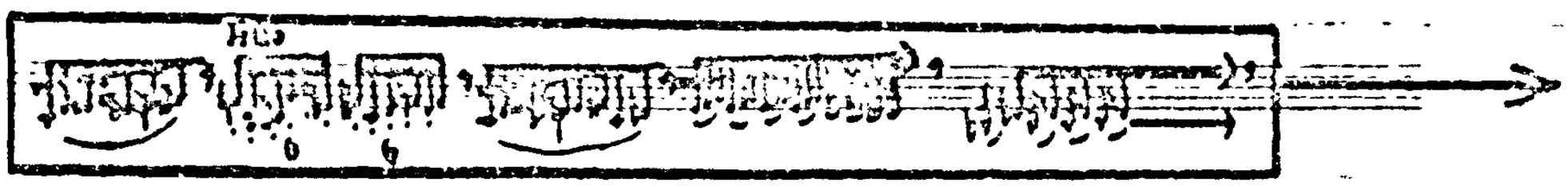
Example 1.5.2

(Concerto Martin Pescatore Martin Dalby p. 21)



Example 1.5.3

(Concerto Martin Pescatore Martin Dalby p. 21)



the performer is presented with a band, or range, of pitch then this concept may be readily interpreted within the compasses of other parameters available to the composer. Hence it follows that a scale may be established within the limits of determinacy and aleatorism, with steps representing various degrees of organization. This may be done quite simply by alloting to the various parameters different sized

band-widths within which the player will have complete freedom of performance.

Within the introduction to Klavierstücke V - X there appears a quite exhaustive list of symbols to be used in the performance of individual (and group) pitches. To take one of these symbols (Example 1.5.4) and illustrate its potentialities within various micro-form-structures will demonstrate the freedom available.

Example 1.5.4

Staccato-Anschlag und sofort hinterher Taste stumm niederdrücken, so dass der Ton nach dem kurzen Anschlag leise weiterklingt ( ).[18]

This staccato attack and decay will firstly be governed by two phenomena uncontrollable by the composer: namely the particular instrument used and the technical achievement of the person performing the piece.[19] Those parameters which the composer can control are pitch, timbre, dynamic intensity of attack (or at least the region thereof): all of these will automatically impose their own limiting factors upon duration and decay.

These empirical measurements of the various parameters available are obviously the result of directly imposing the sensitivity of the player/instrument onto the musical score. The metamorphosis of

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[18] The staccato attack should be immediately followed by depressing the key silently so as to prolong the note softly after the short attack.

[19] It is obviously possible to specify the (maximum) duration of the note either by using a strict metronome marking or a time-elapse graph.

empiricism into a scale the degrees of which are various levels of empirical freedom may be illustrated in two works by Stockhausen.

Firstly the application of this process on the small-scale will be considered. In the directions to Refrain nr. 11,[20] Stockhausen indicates that duration is dependent upon the level of decay reached after a note of specific dynamic intensity has been struck. This he does by the simple means of using five different pause markings (Example 1.5.5), each of which is double the preceeding one.

Example 1.5.5

Pause Marking					
Approximate Duration	0.5s	1s	2s	4s	8s

Secondly, on the macro-scale, in Klavierstück XI nr. 7, the overall form is subdivided into the nineteen groups printed with random distribution on one huge sheet of paper. The distribution is as near random as possible in order that the composer's direction as regards choice of group may be followed (the direction being that the performer moves from one group to another as his eye chooses). Obviously the form of the work is the result of a reducing sequence of cursory selections of groups.[21] Since the work must conclude at the first repetition of

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20 Stockhausen's revised directions for the performance of Refrain are to be found on the sleeve of the recording by Aloys Kontarsky, Caskel and Stockhausen on STGBY 638 and on page 26 of Texte Band 3, by Stockhausen.

21 A further discussion of the processes at work within Klavierstück XI may be found on page 121

a group, then the duration of the composition is undefined, depending as it does on the particular selection made; it will, however, have upper and lower limits imposed firstly by the transference of micro-scale variability onto the macro-scale and secondly by the performer's technical limitations.

1.6 Polyvalence

From the last paragraph of the preceding section it may be seen that certain parameters imposed on Klavierstück XI are done so in a rigid fashion. Those being the parameters of order of pitch and duration within a group, and of the relative duration of the various groups. Naturally it follows that these parameters might also be rendered variable; indeed, in Zyklus, nr. 9, (1959), all the parameters are varied, and as such the work might be considered to be the first in which Stockhausen uses the principle of polyvalence.

The noumenon of polyvalence, when applied to all the aspects of musical form, implies that for each and every moment in the course of the composition there exist varying numbers of equally authentic possible solutions. It is implicit in the preceding definition that the performer's (or performers') selection of which solution to use, whether it be before or during the course of the work, is written into the composition itself.

Obviously it is possible to set up a scale of polyvalence from the lower limit of rigid formation up to the extremes of polyvalence or indeterminacy. Within the course of Zyklus there are nine such degrees of polyvalence.[22] Although it has already been demonstrated that

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[22] Stockhausen's own analysis of Zyklus is to be found on pps 73 to 100 (with especial reference to pps 77 to 94) of Texte, Band II.

Refrain contains elements of variable-form-structure it is necessary to take this further and discuss the application of polyvalence to this work. Basically the form is based upon the old principle of the burden (or refrain) and verse. Within the individual notes/aggregates of notes, Stockhausen has created a dual interdependability: duration is governed by dynamic intensity (decay from the initial attack) which in turn is subject to pitch. Over the first of the two continuous pages, which has six systems upon it, is laid a plastic strip on which are marked various directions for each stave (the refrain). The implication in the attitude of the strip, which should be different for each performance, must be related to the music, usually prior to actually playing it. Although a further discussion of Refrain is to be found in Chapter Two,[23] it is relevant to mention here that the varying significance of the fixed refrain-indications represents the degree of polyvalence present in the composition, since no symbol on the refrain reoccurs on the printed page.

As is obvious from the preceeding paragraph no two performances of a work involving variable-form-structure or polyvalence will be the same (even if, in the case of Refrain, the plastic strip is always fixed in the same position). It would be possible to either completely determine the musical experience down to the last nuance of duration or dynamic intensity (in which case the mechanical aspect of the performance might be better interpreted by synthetic means), or impose a high degree of indeterminacy by allowing the progression of the music to dictate the sequence of events.

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[23] see p. 129

1.7 Moment

To return to the analogy with open and closed forms,[24] an open-form, such as simple AB, is one in which not only are both sections incomplete, but the whole composition is also unfinished in the sense that the more psychologically satisfying closed-form, such as ABA, is. If the concept of open-form is considered from Stockhausen's point of view, or at least his viewpoint during the late fifties, then the implication is of a form which might be symbolically notated as:-

A B C D E F G H I J K L M N ...

That is to say the noumenon of moment-form is of an open-form which has no conclusion or beginning. It will, however, possess a definite duration in performance, but the start and finish of this period should be considered as two points a certain time apart in the continuum of the composition,[25] in other words, the score of Momente, nr. 13, only represents that portion of the Momente-continuum that Stockhausen has notated.

Moment-form-structure is completely different from such formal structures as rondo or sonata. The latter require certain formal elements such as first subject group, bridge, episode, codetta etc. The only prerequisite of moment-form is a frame-work, or model, which will establish the basic locations and interrelationships of all the parameters present. To draw a parallel with Anton Webern will help to elucidate this problem. Webern's chief preoccupation was with the pitch-set as model, although there are times when other parameters (duration, dynamic

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[24] see subsection 1.2

[25] Texte, Band I, p. 207

intensity, timbre) approach the same level of organization.[26] Within Stockhausen's concept of moment-form-structure the model is created from the diverse number of possibilities present in the material which is used to compose the work. Hence, it follows that Stockhausen's seemingly obsessive preoccupation with the properties and organization of the elementary material before commencing the composition proper is of great importance in his thorough grasp of the potentialities of moment-form.

Any composer following this plan is immediately able to proceed with the synthesis of the composition (just as writing out all the transpositions of the set would materially assist a "serial" composer). Naturally, this will tend to create situations in which the process of composition will no longer be in accordance with the model: in this case, if there is no reconcilable solution, the model will usually be disregarded.

It follows, therefore, that polyvalence must play a great part in moment-form; whether in respect to the ordering of the models, or the use of variable-form and "Einschübe".[27] Naturally, nearly all the parameters are subject to some degree of organization: in Momente they are all basically linked together via the monadic model of polyvalent moment-form-structure.

Implicit within the preceding discussion of the principle of

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26 a discussion of the organization of parameters in Webern's Piano Variations, op 27, will be found on pps. 81 to 92 of Die Reihe, vol. 3 - Anton Webern, in an article by Armin Klammer entitled Webern's Piano Variations, op 27, 3rd Movement. (tr. Leo Black)

27 Einschübe = inserts: see p.239, Appendix Two

the moment are several novel concepts. There is no longer any need for the composition to be played in its entirety, since that notated section is incomplete in itself; psychologically, however, one suspects that Stockhausen has finished those compositions of his using moment-form-structure at points of tension, and started them in similar fashion. However, since this is highly subjective, it might be acceptable to start Kontakte, nr. 12 or 12½, after 2' 10" (the end of the first moment) of the score have elapsed.

Secondly, a concert could consist of continuous performances of an open-form work (or works) in several neighbouring halls; during the course of which the audience could come and go at will.

Before leaving moment-form-structure, applications of which will be further discussed in Chapter Two, it is imperative to emphasize that during this period Stockhausen was attempting to find ways of not having to conclude compositions, ways of creating multiple works from one score, and methods of making time (i.e. the progression of the composition) nonlinear.

1.8 Process

As Karl Wörner points out,[28] the first person to incorporate the idea of process into an analytical study of a piece of music was Rudolph Réti. In his book The Thematic Process in Music (1951), he expounds his theories in relation to the thematic unity of certain large-scale works written during the classic and romantic period (and implies that this is so throughout the majority of the works of the period to

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28 Stockhausen: Life and Work: Karl Wörner, p. 112

date, 1950), as, for example, in both the Piano Sonata in c, op 13, and the Symphony no. 1 in c, op 21 by Beethoven.[29]

In his studies of Mozart's cadential figures,[30] Stockhausen reached the conclusion that there exists within the equally-important rhythmical and harmonic sections a strictly classified synthesis. In this process sixteen rhythmic forms of cadential opening and close (with the exception of hybrid forms and the occasional eccentricity) are combined with the harmonic cadential openings and closes.

From the two previous examples it may readily be seen that the phenomena of theme[31] and cadence have both been observed to be fundamental

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29 The Thematic Process in Music: Rudolph Réti, pps. 220 - 222

30 Kadenzrhythmik in Werk Mozarts: Stockhausen, published in Darmstadter Beitrage, (1962). Reprinted in Texte, Band II, pps. 170 - 206.

31 As Wörner quite rightly points out on p. 112 of Stockhausen: Life and Work, the most accurate definition of "theme" is given in Riemann Musik-Lexikon, (1967) pps. 950 - 951

Der wichtigste Thema-Typ besteht nunmehr aus prägnanten, häufig auch untereinander gegensätzlichen Motiven, die, symmetrisch zueinander in Beziehung gesetzt, danach streben, sich selbständig zu entfalten. Daneben ist der liedmelodische Th.-Typ zu nennen, der mehr statische Eigenschaften aufweist, sich vornehmlich in langsamen Sätzen und im Rondo findet und allgemin in der Romantik stärker in den Vordergrund tritt.

([Since the classic period,] the most significant thematic type has consisted of pregnant, often completely opposed, motives. These motives, when placed in symmetry with each other, strive to express themselves independently. Also to be mentioned is the "liedmelodische" (melodic, bel canto) type of theme which shows more static qualities: it is to be found much more in slow movements and in rondos, and usually occurs more frequently in the Romantic composers.)

processes; indeed this whole concept of the process applies up to the early fifties of this century.

Although Stockhausen is not a thematic composer, he has greatly contributed to the concept of process. His theory was first didactically demonstrated in a composition written in 1967, and entitled Ensemble: this piece is for instrument(s) and electronics. Twelve composers collaborated in its composition, writing a part for a chosen instrumentalist with short-wave receiver or tape-recorder. Within the total duration of some four hours each composer was allowed to write a cadenza-like passage somewhere in his own score. In order that a synchronized sound might appear from time to time, Stockhausen composed large-scale ensemble sections which were interposed during the course of events; also intercalated were small-scale ensembles and various synthesized sounds.

During the discussion of moment-form-structure[32] a non-traditional concert experience was envisaged in which several works might be performed in different halls at one and the same time; the audience moving around quite freely. At the initial performance of Ensemble[33] the totally new experience of a performance of a work by thirteen composers, including Stockhausen, was first heard: the performers being distributed around the room in various groups (Example 1.8.1).[34] The process at work within

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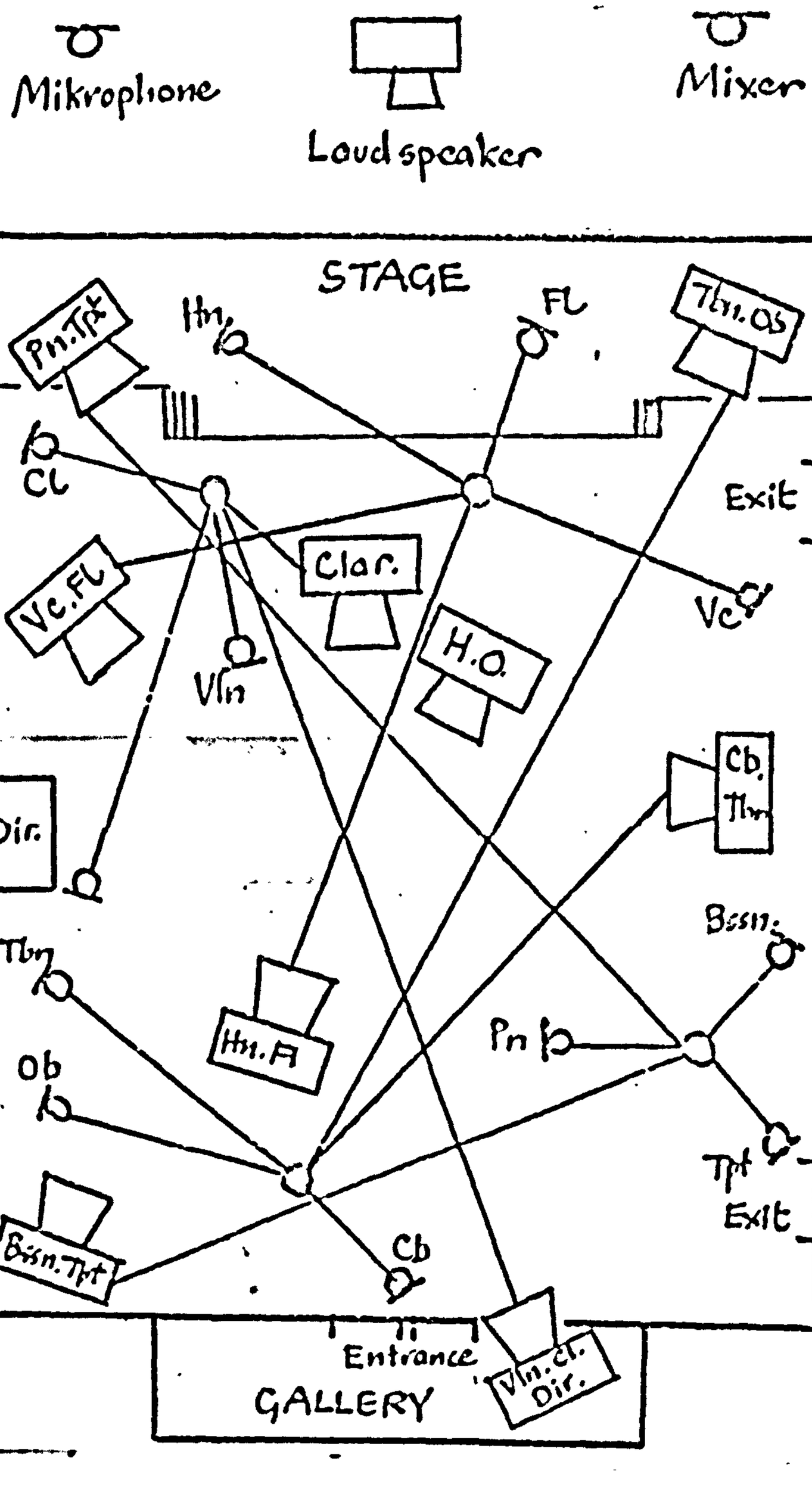
[32] see page 25

[33] 29th August, 1967. Ludwig-Georgs-Gymnasium, Darmstadt. This performance occurred during the 1967 Internationale Ferienkurse für Neue Musik.

[34] Texte, Band III, p. 214.

Ensemble is one of collective co-operation, both in the extended discussion

Example 1.8.1



between all the elements, and the other between total aleatorism and complete organization. As Wörner writes:-[35]

> The result is ..... a composition of compositions.

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[35] Stockhausen: Life and Work: Karl Wörner, p. 115

Naturally, the audience was free to move around the performing area and so also contributed to its own individual process-form.

Of all the works written in process-form, perhaps the one which comes instantly to mind is Prozession, nr. 23. Although this work will be further considered in the next chapter,[36] it would be of value to discuss the fundamental processes at work here.

Each performer is asked to play various variant versions of musical events which they remember from certain previous compositions by Stockhausen.[37] They are also expected to react to the other performers' music. The notated process is one of ectogenic manipulation:

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[36] see p. 189

[37] The work was written for Stockhausen's regular ensemble, for whom he specifies the works selected (Texte, Band III, p. 102):-

> Und zwar bezieht sich der Tamtamspieler zesammen mit dem Mikrophonisten auf MIKROPHONIE I, der Bratschist auf GESANG DER JUNGLINGE, KONTAKTE und MOMENTE, der Elektroniumspieler auf TELEMUSIK und SOLO, und der Pianisten auf KLAVIERSTÜCKE I - XI und KONTAKTE. Filter und Regler spiele ich mit einer ähnlichen Technik wie in MIKROPHONIE I.
>
> (Briefly, the tamtam and microphone derive from Mikrophonie I, the viola from Gesang der Jünglinge, Kontakte and Momente, the electronium from Telemusik and Solo, and the piano from Klavierstücke I - XI and Kontakte. I controlled the filters and potentiometers in a similar fashion to that in Mikrophonie I.)

adding, subtracting or equating the levels of the components from one event to the next.[38] Starting with any event, the performer plays that event through; thereafter the basic intention is that the player should move to the next event, interpreting the given signs by his reaction to either his last event or the event of any other player.

As with all of Stockhausen's process scores, the duration of performance is not fixed for Prozession; a minimum span of about twenty-three minutes is given.[39]

Stockhausen, himself, has said that the transformation processes at work within such works as Prozession and Kurzwellen, nr. 25, are very

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[38] As he writes in Texte, Band III, p. 103:-

Für jeden Instrumentalisten gibt es eine Stimme mit einer Reihenfolge von +, -, = Zeichen. Diese Zeichen bedenten:

+ höher ODER lauter ODER länger ODER mehr Glieder
- hiefer ODER leiser ODER kürzer ODER weniger Glieder
= gleiche (ähnliche) Lage UND Lautstärke UND Dauer UND Klangfarbe UND Zahl der Glieder.

(Each player has a score which consists of a sequence of these signs: +, - and =. These signs indicate:-

+ higher or louder or longer or more elements
- lower or softer or shorter or less elements
= the same (similar) register, intensity, duration, timbre and number of elements.)

[39] Similarly, in Kurzwellen there is an approximate duration of between forty-five and fifty minutes specified.

much the same as those which he employed in realizing such tape-pieces as Kontakte.[40]

1.9 Transformation

At the same time as Stockhausen was evolving the techniques of polyvalence, moment and process he was also at work upon the phenomenon of transformation. Scales of transformation have been previously mentioned,[41] but it is now worth giving a little more space to an explanation of their use.

Having accepted that duration and pitch are essentially manifestations of the same phenomenon, it is possible to demonstrate that a scale of transformation might be set up to cover the area of musical-time in which duration becomes pitch.[42] The physical explanation is as follows: if a short fundamental phase,[43] which is internally segmented

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40 As he writes in Texte, Band III, p. 57:-

> Nach der Komposition KONTAKTE für Elektronische Klänge, Klavier und Schlagzeug, in der auf Tonband gespeichterte Elektronische Musik zum Spiel von 2 Instrumentalisten synchron über Lautsprecher wiedergegeben wird, suchte ich nach engeren Verbindungen von Elektronischer und instrumentaler Musik.
>
> (Following the composition of Kontakte for electronic sounds, piano and percussion, in which electronic music on tape is played through loudspeakers at the same time as which two instrumentalists perform, I then looked for closer connections between electronics and instrumental music.)

41 see page 6

42 the area between 15 Hz and 30 Hz

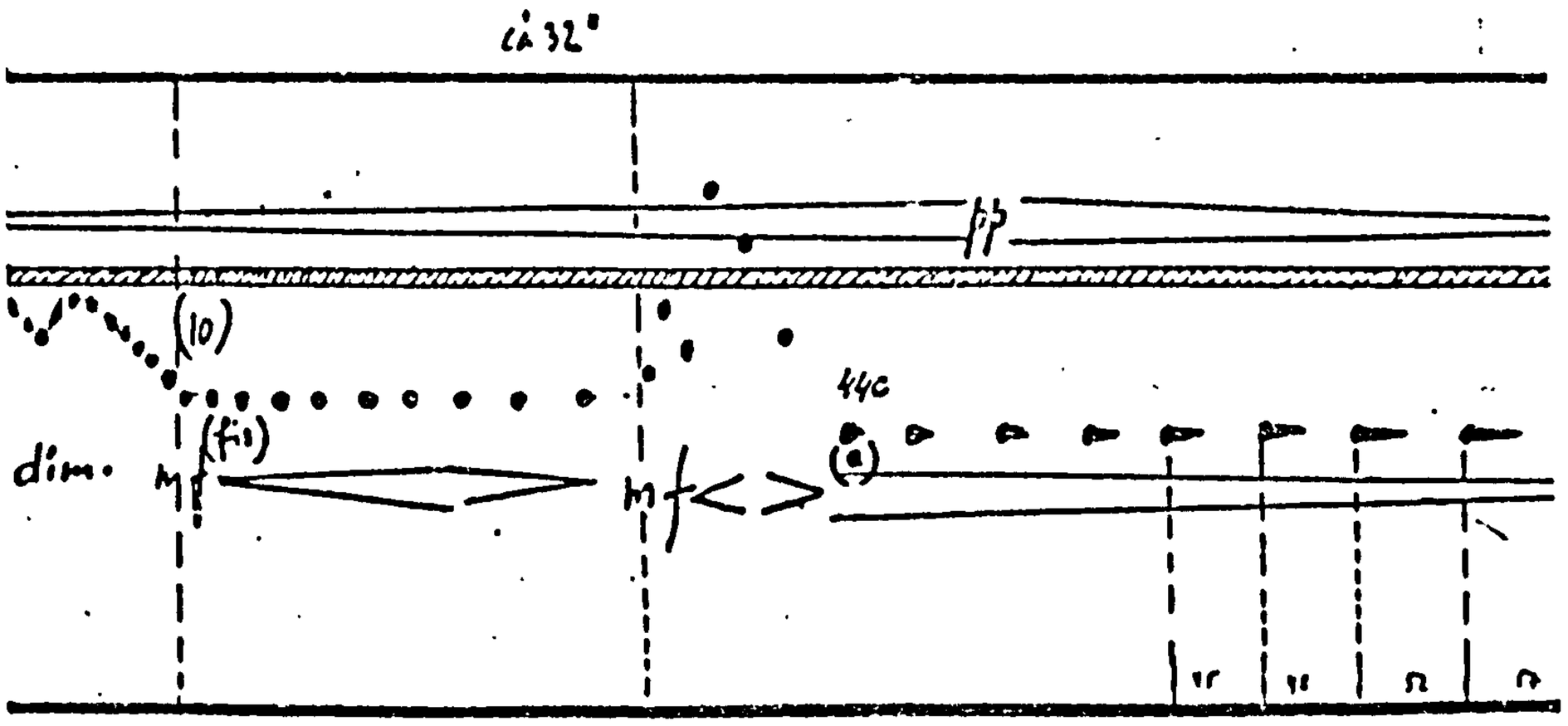
43 the interval of time between two alterations in an acoustic field

either by changes in pitch or dynamic intensity, is periodically repeated and then accelerated a stage will be reached at which this periodic repetition becomes a definable pitch; its timbral quality being subject to both its own degree of internal periodicity and overall envelope. It thus follows that, by careful manipulation of these periods, combined with the use of appropriate filtering facilities, the composer will have a great deal of control over the parameter of timbre: often a large amount of hard work will have to be endured for the mere generation of a few seconds of music.

After studying the overtone spectra and decay characteristics of various percussion instruments, Stockhausen applied the scales of transformation of the organization of timbre so derived to the creation of electronic scores. In Kontakte many examples of this direct application of the interface between pitch and duration may be located. For instance, such an event is to be found between 17' 0.5" and 17' 38.5" (Example 1.9.1).

Example 1.9.1

(Kontakte: 17' 0.5" to 17' 38.5"; pps. 19 and 20



This continuity from the micro-region to the macro-region of the time-continuum of music is a technique which Stockhausen has made much use of, as will be illustrated in examples throughout the next chapter. The transformation of material from one state to another seemingly unrelated level is one way in which the composer may be enabled to integrate the various scales of transformation present within his work: this constant feedback will help to establish, for a particular work, a generic universal scale of transformation.

1.10 Meta-collage

The phoumenon of meta-collage is one particular aspect of the general concept of transformation, and is best explained by reference to an illustration. Just as in Kontakte the transformation from duration to pitch can be easily demonstrated,[44] a similar phemonenon may be detected in Hymnen, nr. 22,[45] whereby the transposition of material by acceleration or deceleration to form a transformation-process can be shown to be of use in connecting the extremes of known and unknown. At the beginning of the second region a high-pitched "silver" sound which has been more or less predominant throughout the whole of the first region descends to reveal that it was, in fact, the acceleration of the sound of a shouting crowd.[46]

This sort of transformation process is used for much of the

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44 see p. 32

45 Hymnen nr. 22, 22½, 22⅔, see pps. 189 - 195

46 Texte, Band III, p. 96

material to be found in Hymnen, particularly as regards the national anthems.[47] Sometimes they are played so fast that only the bare essentials of their outlines can be discerned, and at other times they are so decelerated that the inner life of every note may be heard:[48] this scale of transformation is similar in effect to that employed in 1.4 Statistical form for differentiating between the pointillist and statistical extremes.[49]

This technique of meta-collage, or intermodulation, is further explored in the tape of Telemusik, nr. 20, which was realized the year before Hymnen, in 1966. In Hymnen the rhythm of one anthem could be modulated with electronically synthesized sounds or even the harmonic material of another anthem:-

> "aus dem Schlussakkord der Schweitzer Hymne zu einem ruhig pulsierenden Bass-Ostinate".[50]

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47 for a further discussion of this aspect of transformation see p. 189-195

48 As in the third region:

"Sie beginnt mit der langsamen, jetzt ungemischten Fortsetzung der "Russischen" Hymne, die als einzige ganz aus elektronischen Klängen gemacht wurde, mit der grössten harmonischen und rhythmischen Expansion, die ich bis heute komponiert habe." (Texte, Band III, p. 97).

(It begins with a slow, now unmixed, continuation of the Russian anthem, which for once is built up of wholly electronic sounds, it has the largest harmonic and rhythmic expansion of anything that I have so far composed.)

49 see p. 15

50 Texte, Band III, p. 97

(from the final chord of the Swiss national anthem is created a calmly pulsating bass ostinato).

It would then be possible to give that synthesis the envelope-shape of another anthem, so creating a whole complex of interdependencies. This synthesis is in direct conflict with the collage effects of the majority of other twentieth century composers in that, whilst Stockhausen is striving for homogeneity, they are trying to keep separate the various heterogeneous elements.

It follows that meta-collage is by no means the prerogative of tape-music: such a characteristically electronic device as inter-modulation can find application outwith the studio. In Stimmung, nr. 24 (1968), a note from a specified harmonic series-chord is modulated, according to instructions in the models issued to the singers, with rhythmic and timbral variations.[51]

1.11 Intuitive Music

During his 1966 visit to Japan Stockhausen tells how, in attending many religious rituals and performances of the Nō theatre, he experienced the expansion of time-consciousness which is so well illustrated in Hymnen and Stimmung. This musical-cum-philosphical way of thinking resulted in the creation of intuitive music - music in which all the performer has for a score is a meditative text. ES,[52] from Aus den

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[51] Further treatment of Stimmung will be found on p. 198

[52] It

seiben Tagen nr, 26 (1968), is perhaps the most extreme example of intuitive music. The performer is instructed to play only when he has achieved the state of non-thinking: the corollary being that in this state the player will be able to react in a purely intuitive fashion. Further consideration of intuitive music will be found in Chaper Two.[53]

1.12 Mantra

This represents a return to the completely notated scores of the early fifties. According to Stockhausen's own interpretation of 'Sri Aurobindo - of the adventure of consciousness' by Satprem, a mantra is an all-pervading noumenon. In Mantra the composer uses a thirteen element 'set' (termed the 'mantra'), and by processes of expansion, contraction and transposition he creates the whole work from this one simple statement: elaboration of the procedures adopted in Mantra will be found in section 2.40.

This chapter began with set-composition and pointillism and has shown how Stockhausen's music has grown beyond these procedures without completely rejecting them (except perhaps in intuitive muisc). In the progression from work to work there has been found a continued widening of the realm of creative possibilites: the fixed nature of sets and pointillism has evolved by a gradual relaxation of ectogenic controls. It would not be too subjective to call this process a reintroduction of the quiddity of music into Stockhausen's compositional technique.

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53 see pps.198-200

CHAPTER TWO

A register of the works of the composer illustrating the various procedures used

The purpose of this chapter is to discuss all of Stockhausen's output within the period specified.[1] Some works will be considered in far greater detail than others: it being essential to bear in mind that detailed analysis of every work will not necessarily reveal any more information about Stockhausen's compositional procedures. However, each work will be mentioned, with at least a discussion of its history and formal procedures where significantly different from those of the more symptomatic compositions. Where analysis is given, it is concerned far more with the "entstehung" of the process rather than for the sake of that process; as Paul Klee wrote in 1921:-

> "der Analyse ist die Untersuchung des Werkes
> die Stadien seiner Entstehung hin"[2]

Too often, in the music of the supposed avant-garde, detailed analysis tends to imply that only an interesting form exists: works of musical merit and worthiness tend not to have those attributes expressed:-

> "Das betone ich, damit nicht des Missverständnis
> entsteht, also ob ein Werk nur aus Form bestehe"[3]

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1 For information regarding the works outwith this period see Appendix One

2 Das bildnerische Denken (Analyse als Begriff): Paul Klee, p. 99
"Analysis is the examination of works in order to discover their genesis".

3 op. cit. p. 100
"I stress this point so as to avoid the misconception that a work only has Form"

2.1 Kreuzspiel nr. 1/7

(Crossplay)

Year of composition	:	1951
Forces required	:	oboe, bass clarinet, piano (doubling woodblock), percussion (3 players: 6 tom-toms, 2 tumbas or congas and 4 cymbals)
Dedicated to	:	Doris Andrae[4]
First public performance	:	Darmstadt Summer School, 21st July, 1952
First broadcast	:	W.D.R. Cologne,[5] December, 1951
Duration	:	c. 10 m.

Kreuzspiel is the first of Stockhausen's compositions which are available for study.[6] He was influenced in the writing of this work by Messiaen and Boulez. Although he was to go and study with Messiaen in Paris during 1952 he was already cognizant of Quatre Études and Mode de valeurs et d'intensities; of works by Boulez he was aquainted with Le soleil des eaux. These compositions, all written at roughly the same time, share with Kreuzspiel the virtue of being amongst the first pointillist works to appear. As Stockhausen said of his own piece:-

"zu den ersten Kompositionen 'punktueller' Musik"[7]

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4 Stockhausen's first wife

5 West German Radio (Cologne)

6 As of November, 1973

7 Texte, Band II, p. 11

"one of the first compositions of pointillist music"

As will prove pertinent throughout this chapter, all of Stockhausen's compositions have a title which, to some degree, sets out to explain the contents. Within Kreuzspiel the crossings, or intersections, of spatial and temporal phenomena are displayed. Each parameter which takes part in the "cross-play" is written completely within a set.[8]

The overall form of Kreuzspiel is tri-partite as follows:-

	A	B	C (A∪B)
bars:	14 - 91	99 - 140	146 - 202

The Introduction and first part, bars 1 - 13 and 14 - 91, last approximately 2' 52" and, with the exception of the percussion, this section is begun by the piano at the extremes of its range. Through a crossing of registers a set consisting of the twelve most extreme pitches in the piece is evolved. This is originally within the range from the bottom of the bass clarinet register to the top notes of the oboe - something of the order of four octaves. The combined set for pitch, dynamic intensity and rhythmic duration (measured as the interval between two attacks) is given in Example 2.1.1. The bass clarinet and oboe,

Example 2.1.1

(combined opening set for pitch, dynamic intensity and duration)

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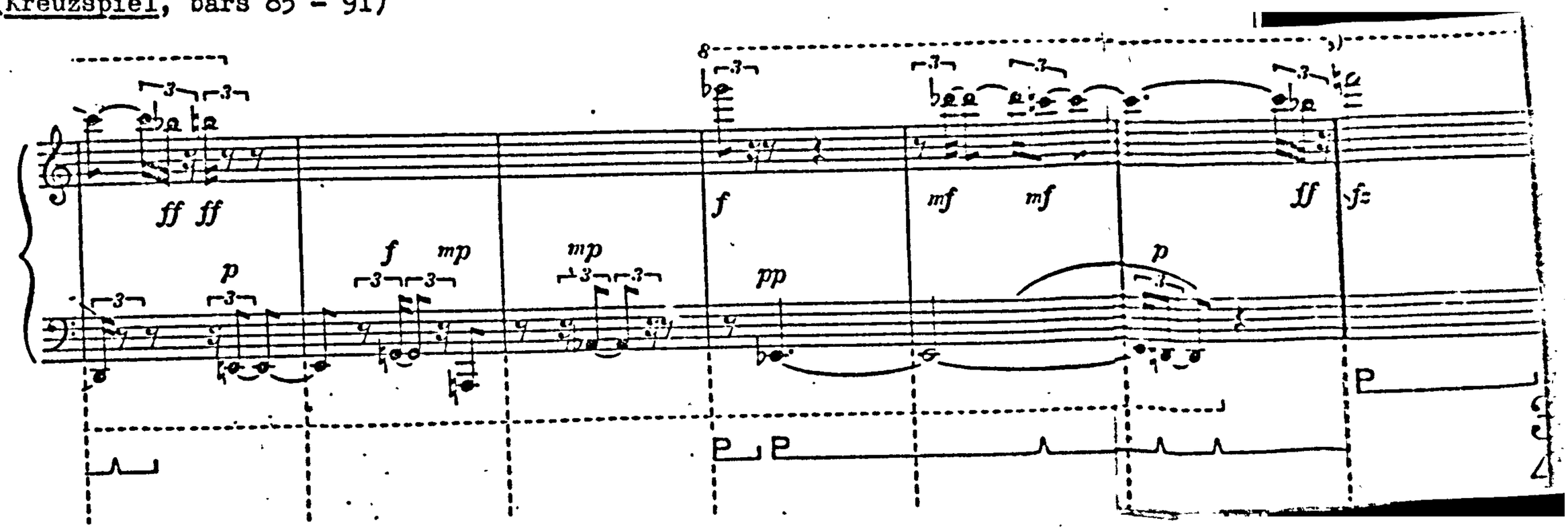
8 Aggregate was considered as an alternative term here, but since this implies no order then set was preferred.

joining in at bars 28 and 32 respectively, take more and more of the pitches assigned to the piano until, at the point where there is normal distribution of the pitches throughout the entire range, a stage is reached at which the dynamic intensity and rhythmic duration sets have internally crossed over to form a sequence of regularly increasing intensities and diminishing durations: the notated equivalent to the two phenomena of crescendo and accelerando occurring coincidently. This stage is emphasized by the pianist playing the combined accelerando and crescendo on the woodblock. (Example 2.1.2)

The remaining bars of this section consist of reversing the procedure in a mirror, so that, at the end of the section, the extreme registers have once more been reached: the difference however is that the six "bottom" pitches are now the six "top" pitches (Example 2.1.3).

Example 2.1.3

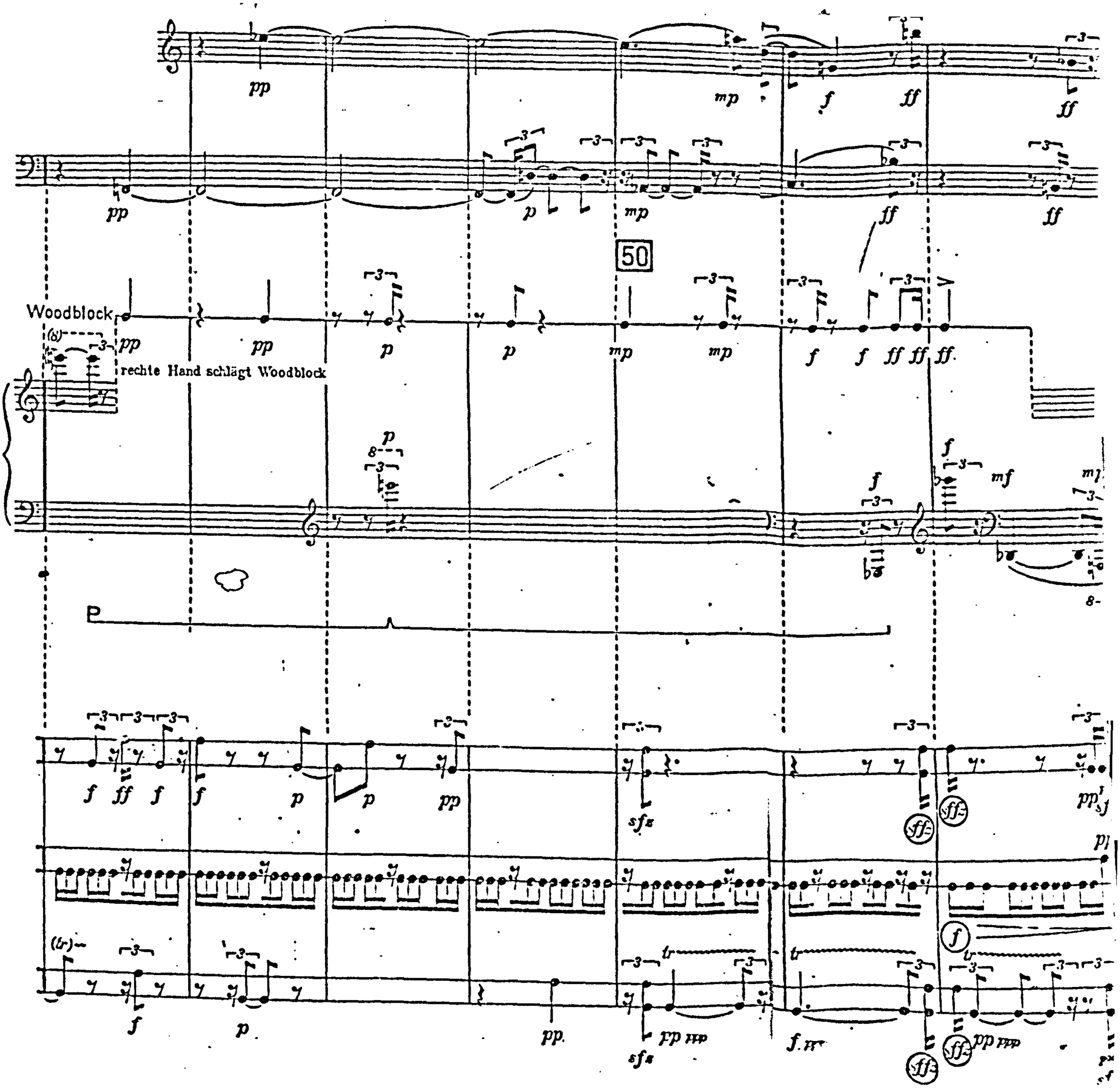
(Kreuzspiel, bars 85 - 91)



The sequential distribution of the sets is given (Example 2.1.4) to illustrate the permutation of the elements. From Example 2.1.4 it may be seen that there are at least three differences between the score and what is correct on paper. Firstly, in bar 52, with the sequence of the pitches Db, G, Gb, Bb, B there should be a sequence of durations 5, 4, 3, 2, 1. However, that given in the score is

Example 2.1.2

(Kreuzspiel bars 46 - 53)



Example 2.1.4

(Sequence of sets in section one of Kreuzspiel, bars 14 - 91)

Pitch	Eb	Db	C	D	Bb	F	B	E	G	A	Ab	Gb
Duration to next pitch[9]	11	5	6	9	2	12	1	10	4	7	8	3
Dynamic Intensity	sfz	mf	mf	p	ff	pp	ff	p	f	mp	mp	f

The following sets are given with only the pitch element, as the duration and dynamic intensity are "tied" to the pitch.

Db	C	D	Bb	F	Gb	Eb	B	E	G	A	Ab
C	D	Bb	F	Ab	Eb	Gb	Db	B	E	G	A
D	Bb	F	A	Db	Gb	Eb	Ab	C	B	E	G
Bb	F	G	Gb	C	Ab	Db	A	Eb	D	B	E
F	Eb	E	D	Ab	A	C	Db	G	Gb	Bb	B
Gb	Db	B	Bb	A	D	G	C	E	F	Ab	Eb
Gb	C	G	Ab	F	Bb	E	D	B	A	Eb	Db
A	Ab	Gb	D	E	B	F	Bb	G	Eb	Db	C
G	A	Ab	Gb	Bb	B	F	E	Eb	Db	C	D
E	G	A	Ab	Gb	F	B	Eb	Db	C	D	Bb
B	E	G	A	Ab	Gb	Eb	Db	C	D	Bb	F

5, 4, 2, 2, 1. Secondly, in bars 60/61, the simultaneous occurrence of Ab and G on the last triplet sixteenth-note of the bar would give durations of 8 and 4 respectively. The succeeding pitch, (F:12), occurs after a duration of 4, therefore, although both notes count in the set-aggregate, the Ab is incorrectly positioned. Thirdly, in bar 60, the Gb and C, although having correct durations and dynamic intensities, are wrongly situated for the scheme in Example 2.1.4 to be correct. If, however, the A is positioned in bar 59, followed by the Gb and C

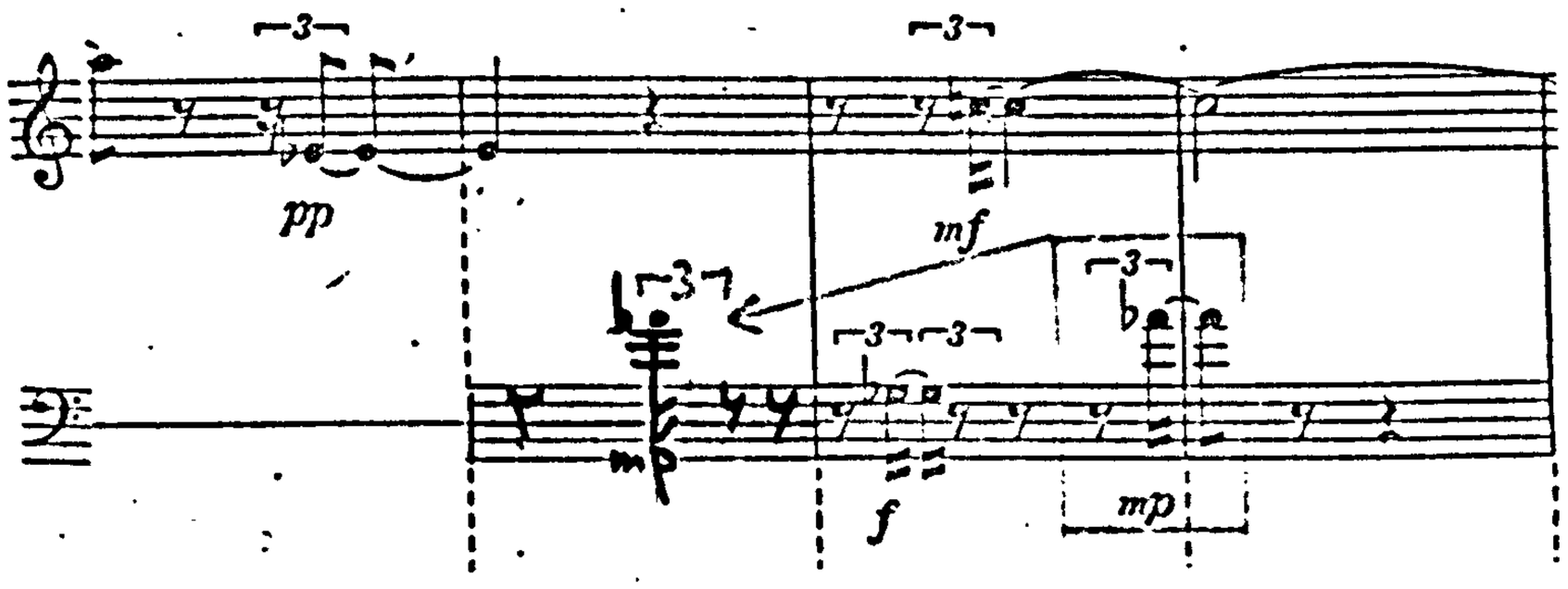
---

[9] Given in multiples of triplet sixteenth-notes

in sequence, then all is correct for the pattern and order.[10] (Example 2.1.5)

Example 2.1.5

(Bars 58 - 61 showing (a) that version in the score and (b) the amended version)



Before moving on to the second section it is necessary to discuss the part played by the percussion in this first section; and as an example the role of the tumbas will be considered.

The set-organization of the tumbas is emphasized by the high tomba playing the accent whilst the low tomba continues the ostinato effect of the triplet sixteenth-notes. After an opening set-aggregate containing one occurrence of each duration from 1 to 12 (where 1 = ♪), the durations are heard in ascending order up to the end of bar 13 and the close of the ♩= 90 introduction. From bar 14 onwards the durations undergo an ordered permutation until bars 46 to 52 at which point the sequence is played in retrograde form: this point corresponds to the woodblock/woodwind retrograde (Example 2.1.2). Since the woodblock is playing the high tumba accents, the latter is omitted here. Following

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10 The question of accuracy in the scores of Stockhausen is relatively difficult to resolve since Stockhausen is a very meticulous worker who checks his music most carefully

this the set regresses in mirror until, bar 85, the set is again one of ascending values. The duration set sequence of the tumbas is given in Example 2.1.6.

Example 2.1.6

(Sequence of sets in the tumbas part of Kreuzspiel, bars 1 to 91)

1	8	7	4	11	1	12	3	9	6	5	10
1	2	3	4	5	6	7	8	9	10	11	12
2	3	4	5	6	12	1	7	8	9	10	11
3	4	5	6	12	11	2	1	7	8	9	10
4	5	6	12	11	10	3	2	1	7	8	9
5	6	12	11	10	9	4	3	2	1	7	8
6	12	11	10	9	8	5	4	3	2	1	7
12	11	10	9	8	7	6	5	4	3	2	1
11*	10	9	8	7	1	12	6	5	4	3	2
10	9	8	7	1	2	11	12	6	5	4	3
9	8	7	1	2	3	10	11	12	6	5	4
8	7	1	2	3	4	9	10	11	12	6	5
7	1	2	3	4	5	8	9	10	11	12	6
1	2	3	4	5	6	7	8	9	10	11	12

* this unit (bar 53) is started by a forte stroke on the low tumba followed by a decrescendo to one degree of dynamic intensity higher than previously, tumba 1 coming in similarly.

There then follows a short passage in ♩= 90 with a duration aggregate in the percussion, this time measured in eighth-notes[11] (Example 2.1.7), the high cymbal now giving the accents to the low tumba.

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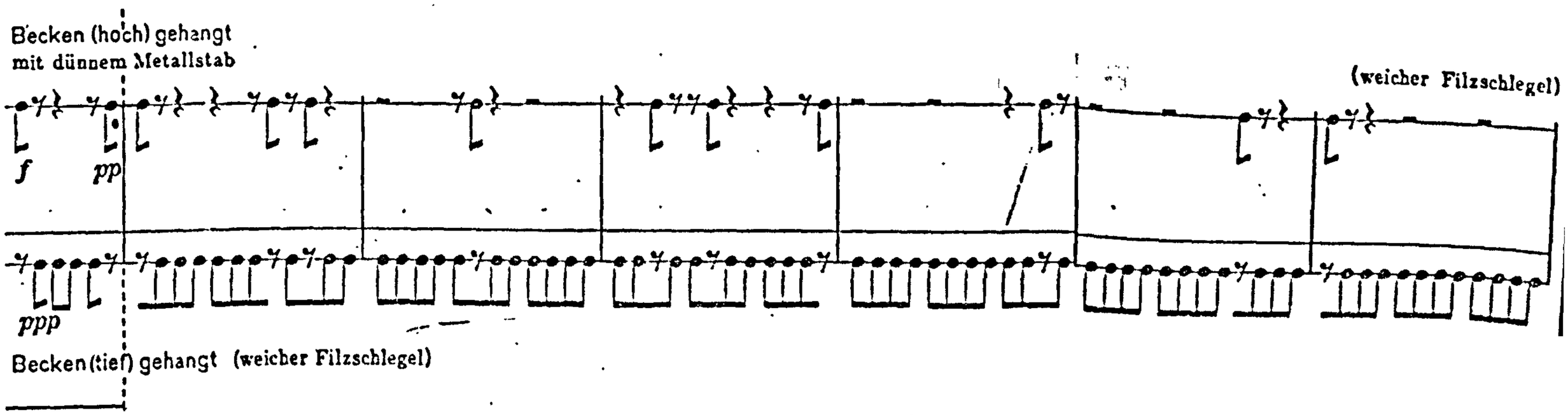
[11] Equivalent to twice the value of the durations in the second section.

Example 2.1.7

(Kreuzspiel, bars 92 to 98)



The second section, bars 99 to 141, consists of a complete reversion of the procedure used in the first section: instead of starting at the extremes and working inwards the section begins with middle register sounds from the woodwind and from there diverges to the limits of the piano, bar 120, and then contracts again.

A reversal of permutative procedure in the sets (durations now being measured in sixteenth notes), is applied in this section: elements are removed from the middle of the set and substituted at the end (Example 2.1.8). Whenever the piano has a chord at least one of the pitches will be simultaneously in unison with a pitch in the woodwind - the other notes having occurred previously in the same set-aggregate, usually in the same register. (Example 2.1.9).

Throughout this section cymbals are substituted for drums, and they undergo their own duration/dynamic intensity permutations; the duration sequence is given in Example 2.1.10.

Between sections two and three there is a five bar passage in the tempo of the first section (♩ = 136), during which the tumbas play a rhythmic pattern in sixteenth notes (Example 2.1.11), against a held chord on the piano and bass clarinet. This pattern forms a twelve-element aggregate.

Example 2.1.8

(Sequence of sets for pitched instrumental lines in section two of Kreuzspiel, bars 99 to 141)

Pitch set	Db	Gb	B	Bb	A	G	F	Eb	D	Ab	E	C
Duration to next pitch	8	12	6	11	5	4	10	7	1	3	9	2
Dynamic intensity	f	p	f	p	f	p	mp	mp	pp	mp	pp	p

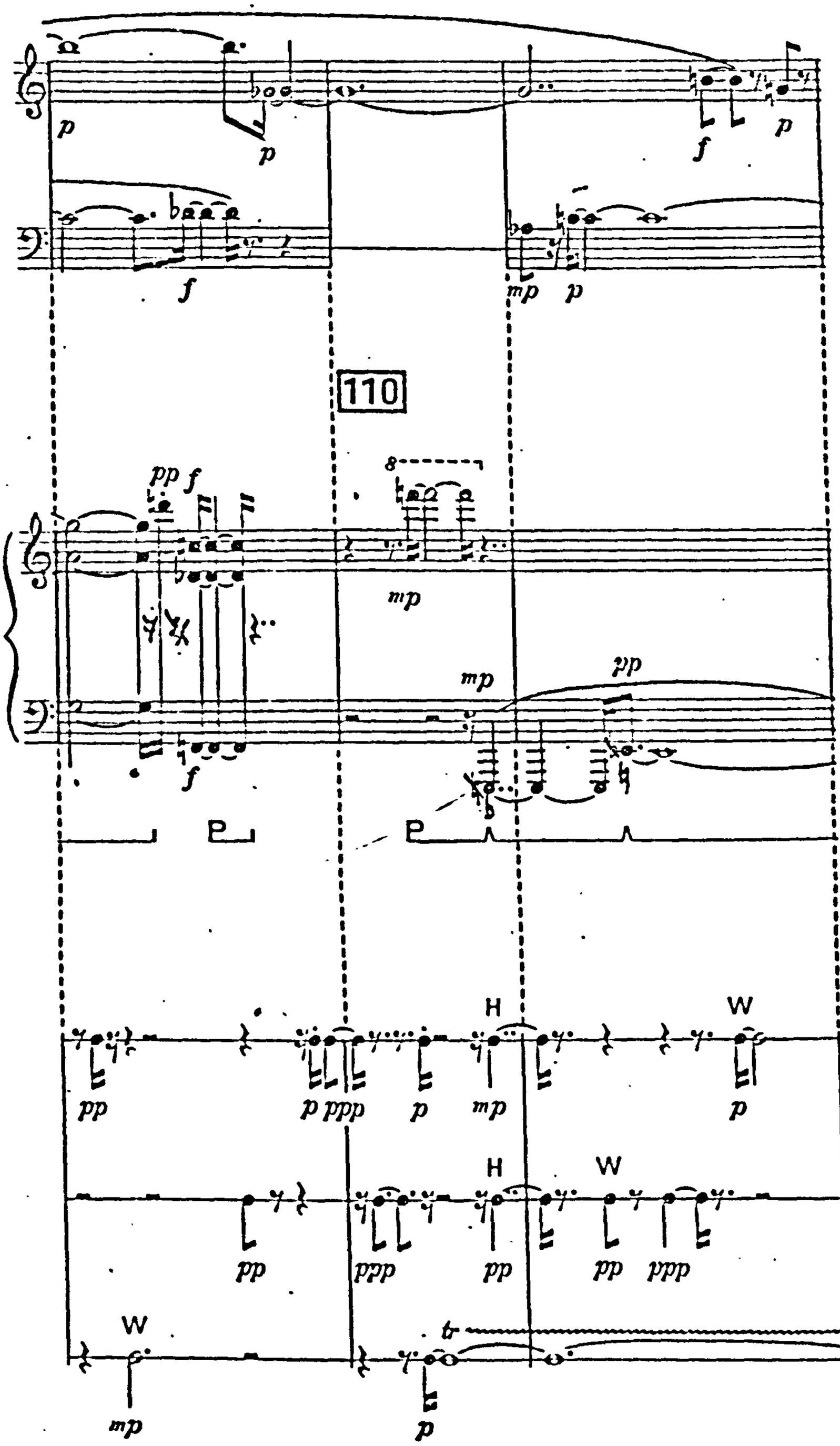
The following sets are given with only the pitch element, as the duration and dynamic intensity are "tied" to the pitch.

A	Db	Gb	B	Bb	F	Eb	D	Ab	E	C	G
G	B	Db	Gb	F	Eb	D	Ab	E	C	Bb	A
A	Bb	D	Db	Gb	F	E	Ab	C	Eb	B	G
B	G	E	Gb	Db	F	Eb	C	Ab	D	Bb	A
Bb	D	A	Ab	C	Db	F	Eb	Gb	G	E	B
Gb	E	B	Eb	Db	G	Ab	F	Bb	C	D	A
Ab	C	F	D	Bb	A	G	B	E	Db	Gb	Eb
Db	Eb	Gb	E	B	Bb	A	G	D	Ab	F	C
F	C	Ab	B	Bb	A	G	D	E	Gb	Eb	Db
Db	Eb	Gb	B	Bb	A	G	D	Ab	E	C	F
F	Gb	B	Bb	A	G	Eb	D	Ab	E	C	Db
Db	Gb	B	Bb	A	G	F	Eb	D	Ab	E	C

Again the usual discrepancies of dynamic intensity occur. There are also duration errors. For instance, in the piano part, bar 109, the sixteenth-note rest seems wrongly positioned with respect to the D: the "corrected" version is given in Example 2.1.8.A. In the following bars, 110 and 111, the E and E^b seem to be wrongly notated for their durations: the "corrected" version is also given in Example 2.1.8.A.

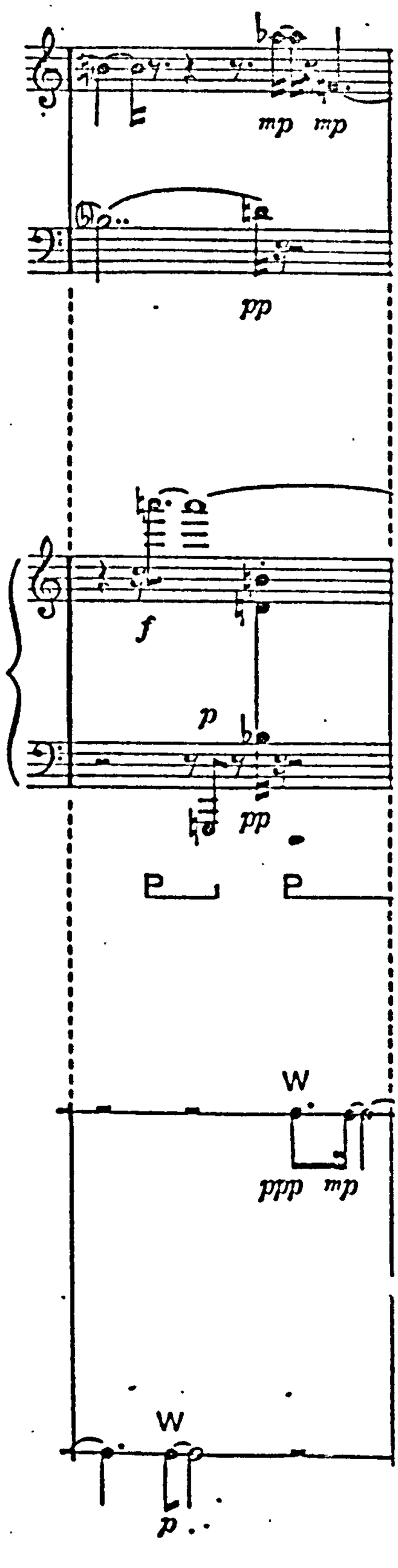
Example 2.1.8.A

(Kreuzspiel, bars 109 to 111: "corrected" version)



Example 2.1.9

(Kreuzspiel, bar 127)



Example 2.1.10

(Sequence of duration sets in Kreuzspiel, section, two, cymbals, bars 99 to 141)

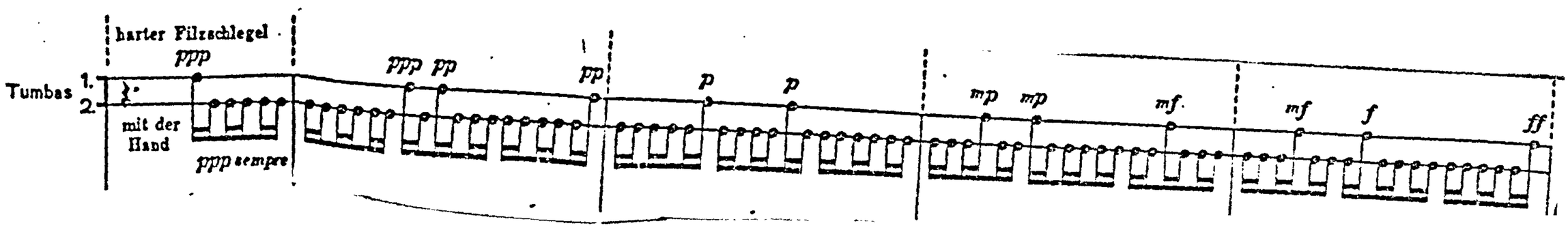
	5	1	7	2	**4**	9	3	6	12	10	4	11
	8	5	7	1	**2**	3	6	12	10	4	11	9
	9	7	5	1	**3**	6	12	10	3	11	2	8
	8	3	12	5	**1**	3	6	10	11	4	7	9
	7	9	4	1	**5**	3	6	11	10	12	2	8
	2	12	8	10	**11**	5	3	6	1	9	4	7
	1	4	7	6	**5**	9	8	3	2	11	12	10
	10	11	3	12	**2**	8	9	7	4	5	1	6
	5	6	1	4	**7**	2	8	9	12	10	3	11
	3	12	10	7	**2**	8	8	12	4	1	6	6
1	4	6	1	7	**2**	8	9	12	10	4	11	3
	3	1	7	2	**8**	9	6	12	10	4	11	5
	5	1	7	2	**8**	9	3	6	12	10	4	8 + 3

As may be seen from lines 10 and 11 the set-aggregates are incorrect if the concept of twelve different elements is to be maintained. The most likely solution to line 11 is for the 1 and 4 to form a **5** and for line 10 to read as follows:-

3 11 10 7 2 8 9 12 4 1 6 5

Example 2.1.11

(Kreuzspiel, bars 141 to 145)



The third section starts at bar 146 and runs through to the end. It consists of a combination of the two procedures adopted in the first and second section, although the notation is now reversed:-

those sets using now use and vice-versa.

The percussion element is maintained by the use of both cymbals and tom-toms. The two systems of set construction run concurrently, as may be seen in Example 2.1.12. The accelerando-crescendo occurs as a ritardando-diminuendo, although it is somewhat obscured by the other set (Example 2.1.13).

The tom-toms have their own duration set (Example 2.1.14) which is similar in construction to that of the tumbas in section one.

Example 2.1.14

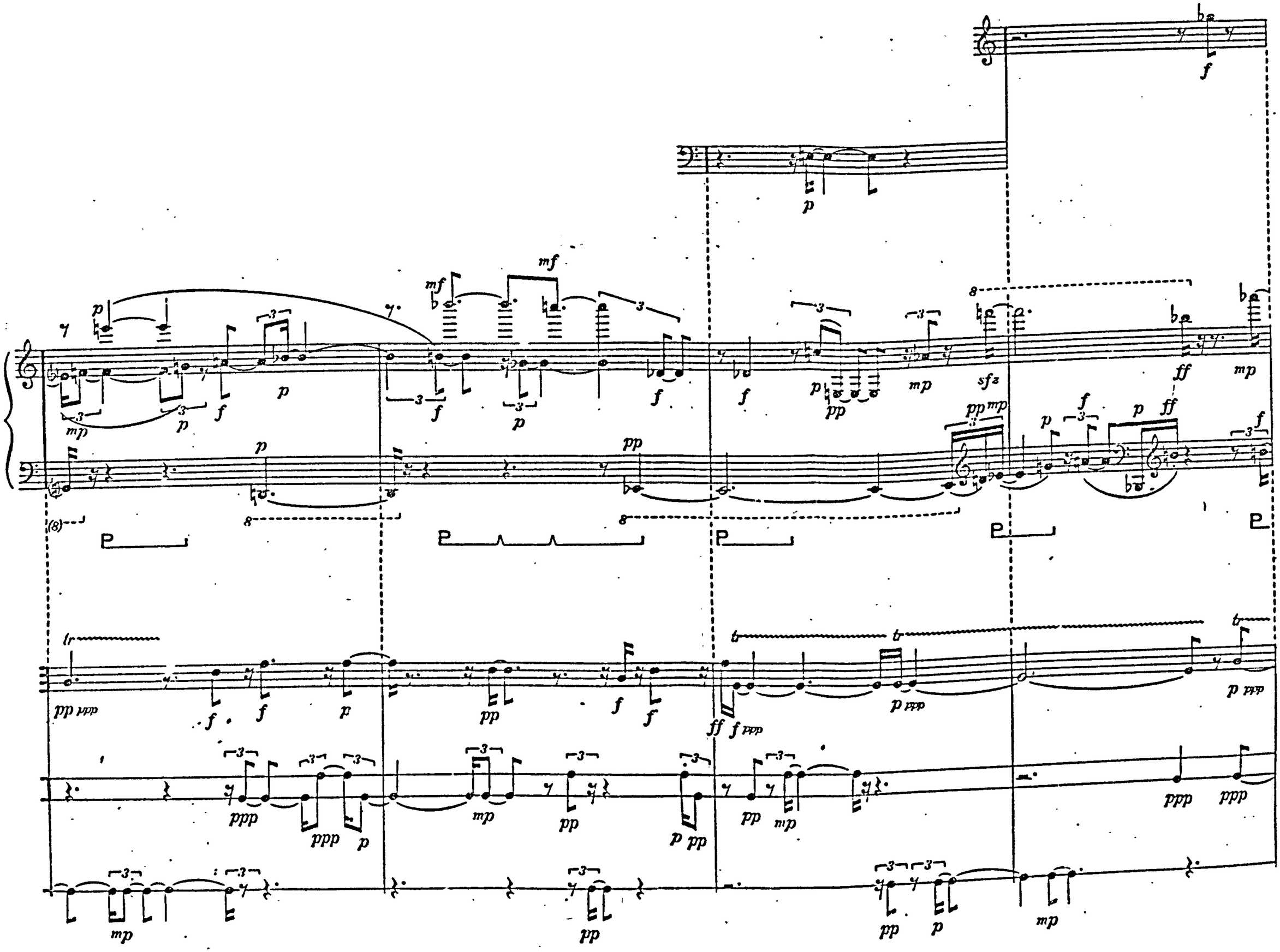
(Kreuzspiel, set-aggregate sequence of tom-toms in section three, bars 146 to end.)

1	11	4	7	8	2	10	5	6	9	3	12
11	4	7	8	2	12	1	10	5	6	9	3
4	7	8	2	3	1	12	11	20	5	6	9
7	6	3	10	11	1	12	3	4	10	5	6
8	2	6	12	4	3	11	1	9	7	10	5
2	5	1	3	7	9	4	6	11	12	8	10
12	11	10	9	8	7	6	5	4	3	2	1
3	12	4	2	6	8	5	7	10	9	1	11
9	2	13	7	5	2	10	8	6	1	11	4
6	9	3	12	8	10	2	5	1	11	4	7
5	6	9	3	12	2	10	1	11	4	7	8
10	5	6	9	3	12	1	11	4	7	8	2
1	2	3	4	5	6	7	8	9	10	11	12

Again several disparities may be seen in this set-aggregate sequence. The 20 in the third line is obviously to be read as a 10. The 2 and 13

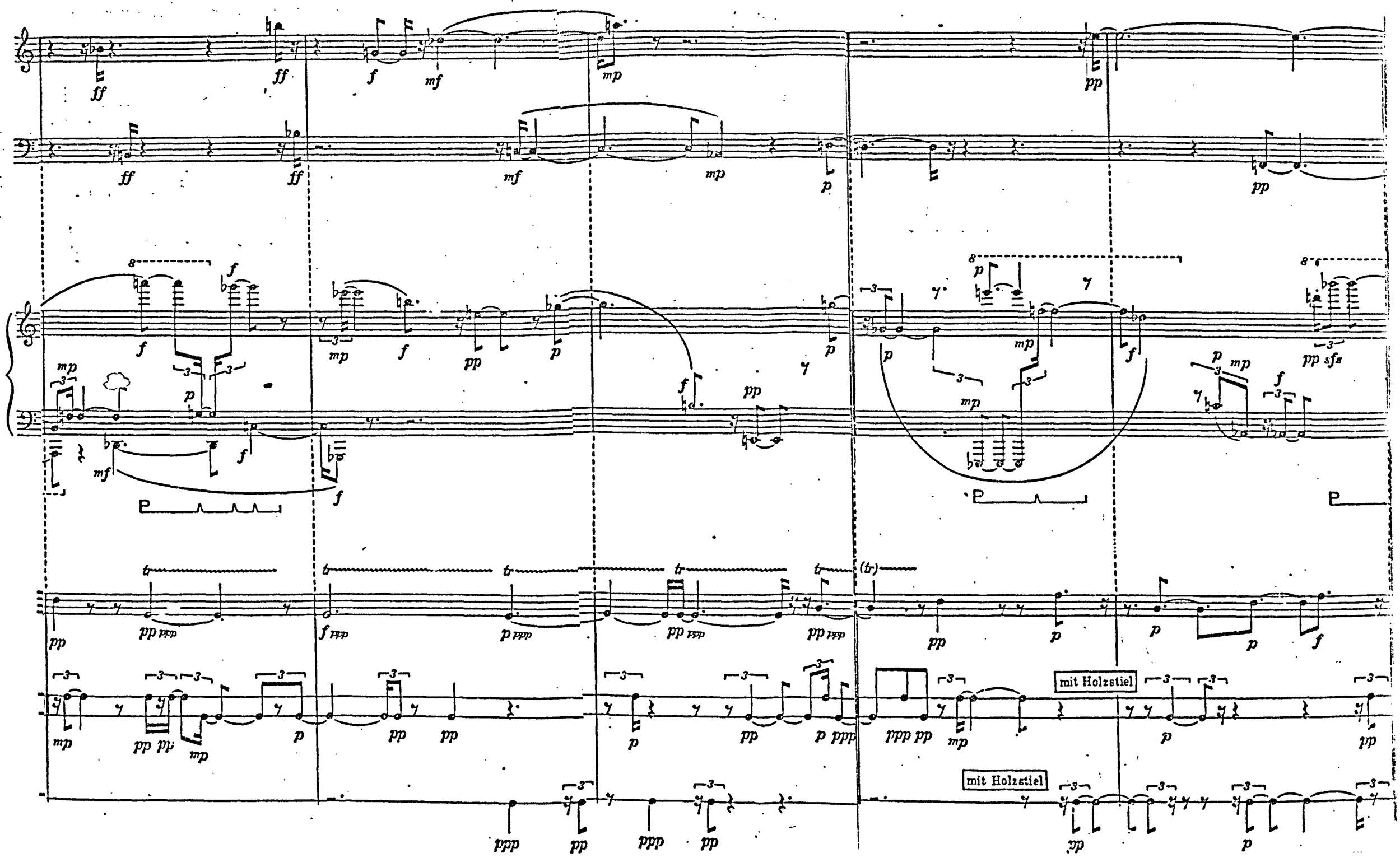
Example 2.1.12

(Kreuzspiel, bars 154 to 157)



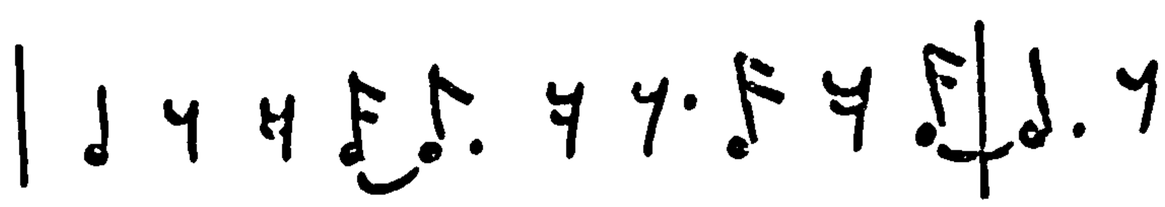
Example 2.1.13

(Kreuzspiel, bars 171 to 175)



Example 2.1.14 (Continued)

in line nine should perhaps be rewritten as 3 and 12 - . The 7, 6, 3, 10 in line four, to preserve symmetry, should be rewritten as 7, 8, 2, 9:



The dynamic intensity aggregate associated with this duration set-aggregate is given as, by a comparison throughout this section between duration and intensity it is possible to see the way in which Stockhausen takes into account context when assigning dynamic intensity (the freest parameter organized in Kreuzspiel):

duration to next note	1	11	4	7	8	2	10	5	6	9	3	12
average dynamic intensity	ff	pp	f	mp	mp	ff	pp	mf	mf	p	f	ppp

Similarly the cymbals have their own set-aggregate sequence.

From the above it may be seen that Stockhausen does not adhere strictly to the sets established. Three reasons may be offered in explanation for this:-

1. The score has been printed wrongly, as is almost certainly the case with Example 2.1.8.A.
2. Stockhausen has made mistakes in his creation of the score.
3. Stockhausen intended these discrepancies to be present.

Since the first point is relatively easy to establish[12] in certain cases, it can be ignored for the present. In the choice between the other two options the second can virtually be discounted as the composer is an extremely meticulous worker. This leaves the third and preferred alternative: Stockhausen did intend the notes to be as they are for musical reasons alone. The many variant versions of the dynamic intensity set are probably attributable to the shortage of different values for the construction of a suitable scale.[13]

2.2 Formel nr. 1/6

(Formula)

Year of composition	:	1951
Forces required	:	orchestra (0333;3000;Pn2-Hp. Cel.Pft;6vln,3vcl,3db)[14]
Duration	:	c. 11 m.

2.3 Étude nr. 1/5

(Study)

Year of composition	:	1951
Forces required	:	musique concrète tape

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12 The establishment of the accuracy of the printed version of the score becomes more and more difficult as Stockhausen's work progresses.

13 see p. 4

14 Using the conventional system of specifying an orchestra:- (Flutes, Oboes, Clarinets, Bassoons; Horns, Trumpets, Trombones, Tubas; Percussion and number of players; other instruments; strings)

Étude was Stockhausen's first essay in the realm of synthesized music. It was written in the P.T.T. studios attached to French Radio, which was then under the supervision of Paul Schaeffer. A consideration of the techniques required for the composition/realization of electronic and concrète music will be found in the section relating to the electronic studies.[15]

2.4 Spiel nr. 1/4

(Play)

Year of composition	:	1952
Forces required	:	orchestra
Dedicated to	:	Doris Andrae
First performance	:	Donaueschingen Festival, 11th October, 1952
Commissioned by	:	S.W.D.R. (South-west German Radio)

2.5 Schlagquartett nr. 1/3

(Quartet for percussion)

Year of composition	:	1952
Forces required	:	piano and three pairs of kettle-drums
Dedicated to	:	Doris Andrae
First performance	:	Musica Viva (Munich), 23rd March, 1953
First broadcast	:	N.D.R. (Hamburg), 12th March, 1953

Although Schlagquartett was performed on at least three occasions and an analysis provided by the composer[16] it was withdrawn along with

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15 see p. 76

16 Texte, Band II, pps. 12 - 18

Kreuzspiel and Spiel in 1952 despite Alfred Schlee's request to have them published by Universal Edition (Vienna). Kreuzspiel was published in the late fifties, but to date no score of Spiel or Schlagquartett has been made available.

2.6 Punkte nr. 1/2

(Points)

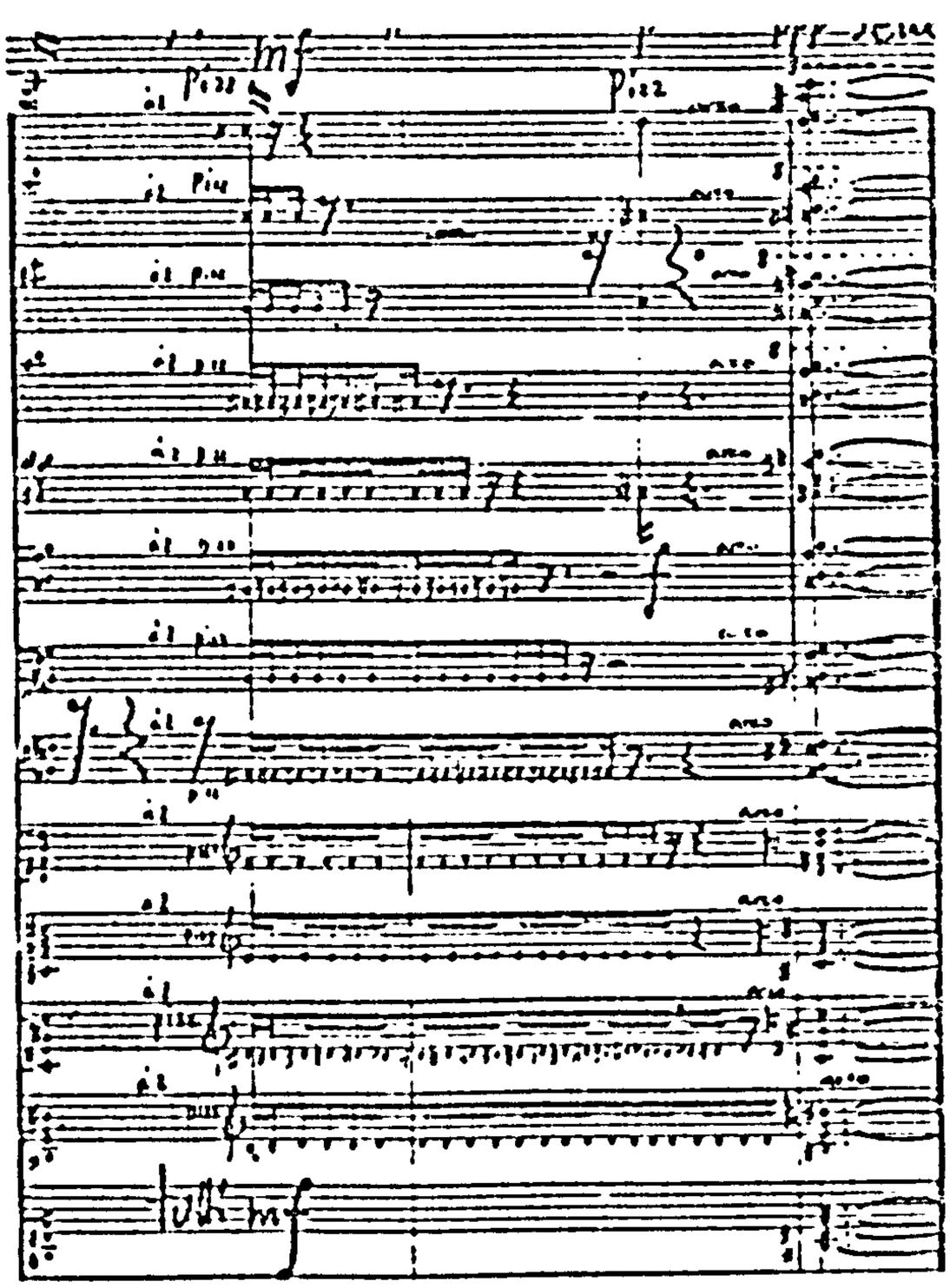
Year of composition	:	1952 (revised 1962)
Forces required	:	orchestra /3 (3 piccolos, 3rd doubling alto flute)3(Oboe d'amore and English horn)3(Eb Bb and bass)3(dble bassoon); 3321;Pn (tubular chimes, glockenspiel, vibraphone, marimba, 2 pedal kettle-drums);2Hp, 2Pft (cel);888647
Dedicated to	:	Doris Andrae (first version) Francesco Agnello (revised version)
First performance	:	Donaueschingen Festival, 20th October, 1963
Commissioned by	:	S.W.D.R.
Duration	:	c. 22 m.

Originally Punkte was a purely pointillist work, but in 1962 Stockhausen rewrote it such that the original "points" became extended by surrounding each of the originally totally sorialized notes with masses of notes arranged in envelope shapes (point structure), by means of the application of such operations as glissandi, accelerating/decelerating trills, tremolos, writing wedges, etc. He designated four notations to

represent these elaborations.[17] An example of such a wedge may be found in bar 96 a,b (Example 2.6.1): the violins and violas playing a contracting pizzicato cluster.

Example 2.6.1

(Punkte, bar 96 a,b, violins and violas)



17 Texte, Band III, p.12

ein Punkt wird nach oben [.◁] oder nach unten [•▽] zunehment breiter; oder ein Tongemisch wird von oben [▷.] oder von unten [▷•] zunehment schmaler; bis es in einen Punkt mündet.

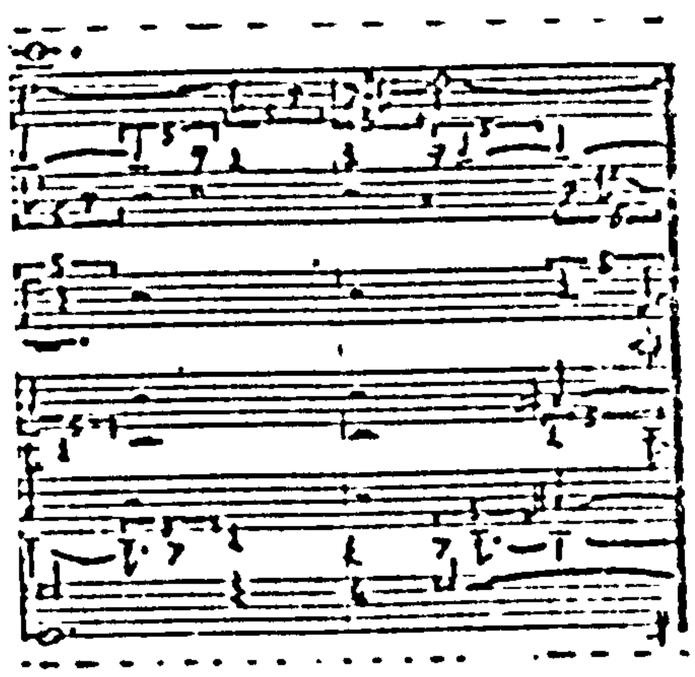
a point becoming progressively wider either at the top or bottom; or a note-cluster becoming progressively narrower either from above or below until a point is reached.

According to the composer,[18] the coincidence of the many complex layers of sound resulted in more notes and material being available than there were forces to play them: the result of this was Stockhausen's composition of the negative equivalents to the positive forms mentioned in the previous paragraph. An example of this negative form may be found in bar 117 b (Example 2.6.2): the strings having an opening and closing figuration composed of glissandi with a crescendo and diminuendo, whilst the woodwind do exactly the same in a simpler fashion.

Example 2.6.2

(Punkte, bar 117 b)

(a) woodwind

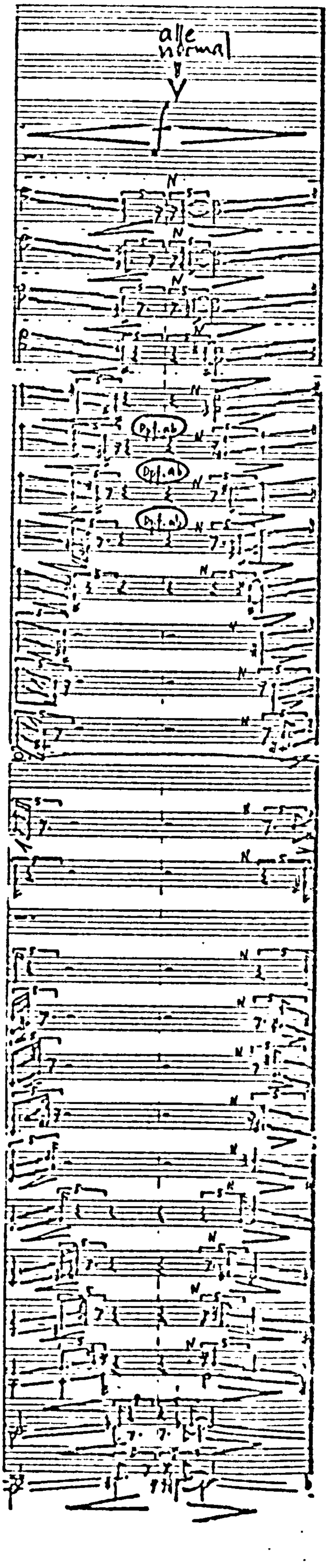


18 op. cit. pps. 12 - 13

Example 2.6.2 (b)

(Punkte, bar 117 b)

(b) strings



Hence a scale of transformation may be set up with the outer limits being the noumena of positive and negative forms. As Stockhausen wrote in 1964:-[19]

> Warum verstehen wir Musik immer nur als Tongebilde im leerer Raum, als schwarze Noten auf weissen Papier? Kann man nicht genauso gut von einem homogen gefüllten Klangraum ausgehen und die "Musik aussparen"?

2.7 Kontra-Punkte nr. 1

(Counter-Points)

Year of composition	:	1952 - 1953
Forces required	:	ten instruments (Fl,Cl,B.Cl,Bssn; Tpt,Tbn;Pft,Hp;Vln,Vcl)
Dedicated to	:	Doris Andrae
First performance	:	Cologne Festival of New Music, 26th May, 1953
Duration	:	c. 12 m.

Within Kontra-Punkte Stockhausen sets up a universal scale of transformation of all parameters with the following limits for the various sets:-

PITCH

Pitch is confined to the twelve chromatic semitones.

DYNAMIC INTENSITY

At the beginning there is a complete range of dynamic intensity

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19 op. cit. p. 12

Why is music still thought of as note-structures in empty space, as black notes on white paper? Would it not be better to have a homogeneously filled acoustic space and "carve out" the music?

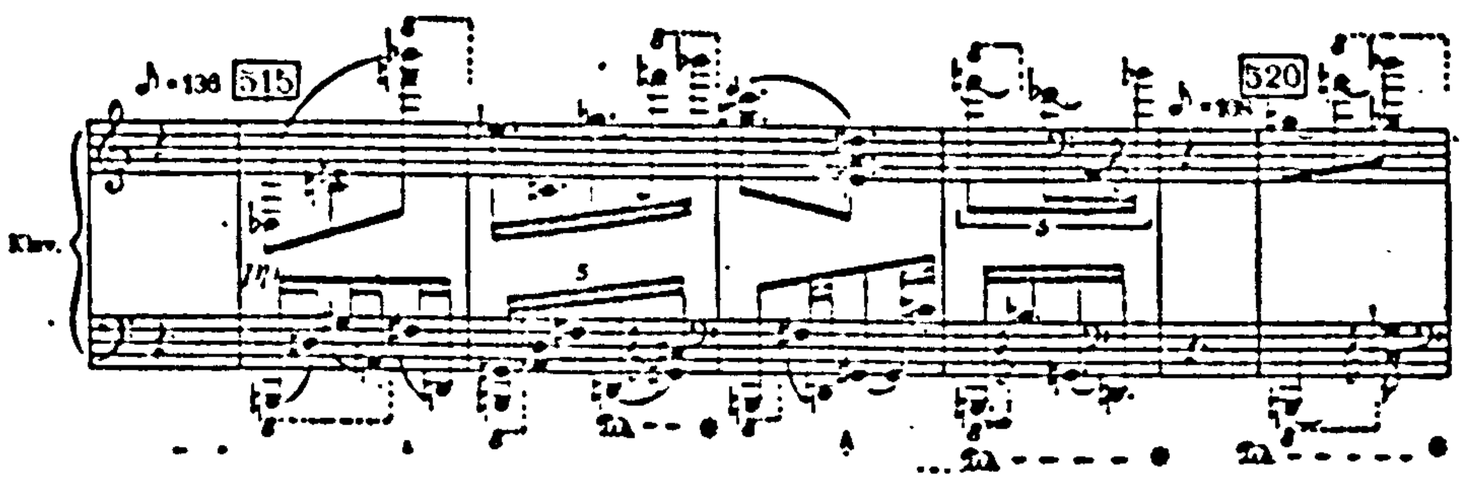
from ppp to sfz which, by the end, contracts to ppp to pp.

DURATION

At the beginning there are large contrasts between long (♩.) and short (𝅘𝅥𝅯) durations.[20] As the composition progresses these work closer together until, at the end, there are used durations of very similar value (Example 2.7.1).

Example 2.7.1

(Kontra-Punkte, bars 517 to 518)



TIMBRE

From an opening timbral complex of six units[21] there is a gradual crystallization to the sonorities of the piano.

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20 Duration meaning the time interval between two attacks.

21 The six timbral units are:-

flute/bassoon
clarinet/bass clarinet
trumpet/trombone
piano/plucked strings
harp/plucked strings
violin/cello

STRATA

From stark contrasts between vertical and horizontal strata the music imperceptibly simplifies into a two-part contrapuntal texture.

TEMPO

There is a tempo scale from ♩= 120 through 126, 132, 152, 168, 184 to ♩ = 200, approximating to the seven pitches with which the work begins: C♯ 274, D 290, E♭ 307, E 325.8, F♯ 365.7, G 387.5, A 435.

Kontra-Punkte consists of a succession of multiple metamorphoses resulting in the creation of a transcendontal unity - all the parameters are transformed continually, with the exception of tempo, in such a way that by the end of the composition the subjective feeling, born out in objective testing, is one of an a priori knowledge of the processes at work.

2.8 Klavierstücke I-IV nr. 2

(Piano pieces I-IV)

Year of composition	:	1952 - 1953
Forces required	:	piano
Dedicated to	:	Marcelle Mercenier
First Performance	:	Darmstadt Summer School, 21st August, 1954
Duration	:	c. 8 m. (2.56 m; 1.46 m.; 0.27 m.; 2.01 m.)

Originally Stockhausen conceived of a series of 21 piano pieces[22]

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22 Stockhausen's Piano Pieces, Roger Smalley, "The Musical Times", 1969, pps. 30 - 32.

arranged in six groups:-

I-IV V-X XI XII-XVI XVII-XIX XX-XXI

At the present juncture the first three of these have been completed, two pieces, Klavierstücke IX and X being revised in 1961.

Although numbered second in Stockhausen's own catalogue of works these four pieces, written in Paris, predate the composition of Kontra-Punkte. They were composed in the sequence III, II, I, IV.

During the fifties there was a great upsurge in the number of scores with extremely complicated standard notation: the natural result of pointillist philosophy. This notational jungle reached such labyrinthine proportions that performers had to do the previously unheard of act of sitting down and actually rewriting tempi to fit the complicated metrical divisions. All four piano pieces are marked to be played as fast as possible, therefore if the fastest one could play the thirty-second-notes in bar 6 of Klavierstück I were to be Γ = 71, then the first eight bars of this piece could be rewritten as in Example 2.8.1.

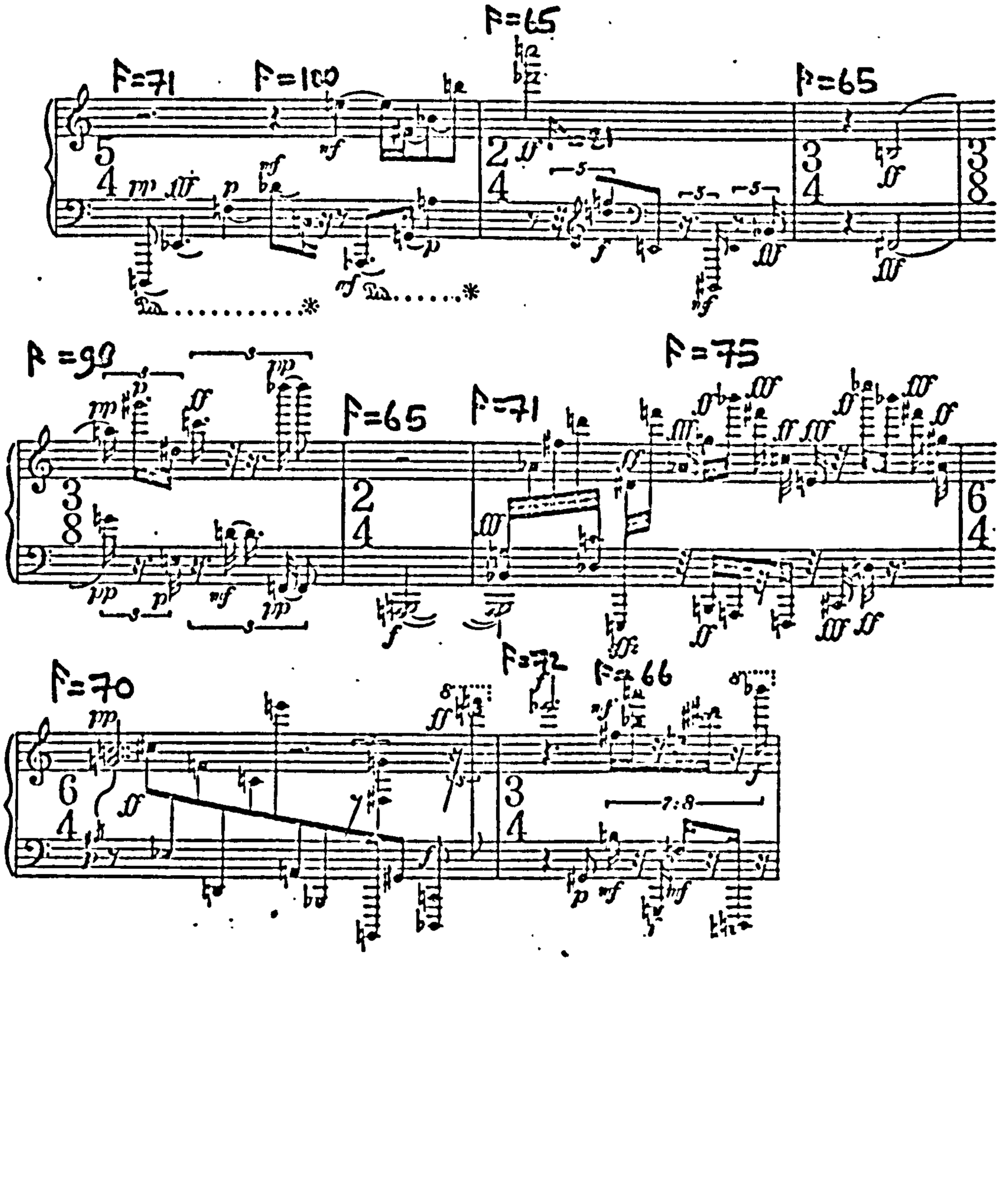
Structurally these four pieces are composed with the use of group technique, and as such represent Stockhausen's first essay in this medium: in fact the coalescence of pointillism into groups can be seen in the first piece with great clarity - especially as regards the pitch parameter. An analysis of the first section of Klavierstück I will serve to clarify the basic technique used in composition with groups.

Group 1:

The first group is equivalent to the first bar (Example 2.8.2), and is characterized by ten attacks written within a range of almost five octaves. The attacks rising up the keyboard with the exception of the falls of a minor ninth (Db down to C) and a minor seventh (E down to F#): the first of these marks the end of the first sub-group which thus contains five attacks as against

Example 2.8.1

(Klavierstück I, bars 1 to 8 with possible tempi indications)



Example 2.8.2

(Klavierstück I, group 1)

the second's seven, which take place in the same time-interval. The second descending interval is written in the middle range of the piano simultaneously with an ascending interval in the lower range so as to preserve the upward trend. This second sub-group contains two diads which are the result of opposite motion of intervals. The final interval (Bb up to B), indicates the direction for the beginning of the second group, with highest pitch one octave and a semitone higher than the highest pitch to be found in group one.

The dynamic intensities in the first sub-group lie within the range pp to fff, and are arranged to give a diminishing scale of contrast until the second sub-group is reached which has the median dynamic intensity of mf, the p on the A being an indication that the B♭ above is the more important note.

The durations between attacks in the first sub-group are naturally longer than those in the second sub-group since the first sub-group has the greater contrast in dynamic intensity.

Each sub-group is characterized by the depression of the

sustaining pedal throughout its duration so as to build up within the group the effect of two arpeggiated chords.

The aural effect of the group is one of a moderate tempo accelerating through the second sub-group.

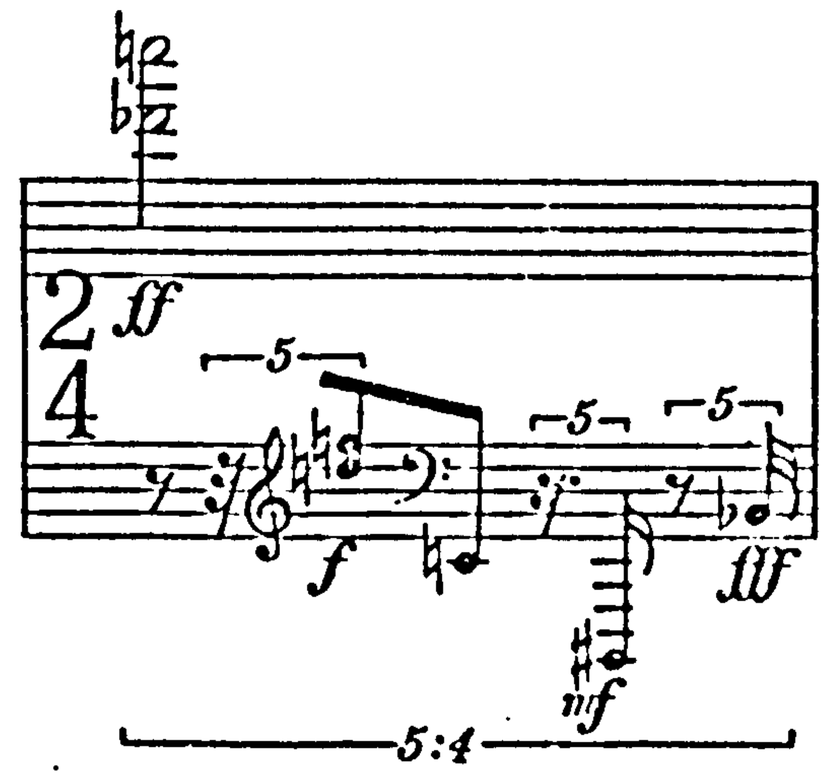
Within this first group all twelve semitones of the chromatic scale are used. They form two hexachordal aggregates which are used throughout the composition of the first piece.

Group 2:

This group, the same as bar 2, (Example 2.8.3), is characterized by a downward trend of four attacks (seven pitches), separated by large intervals, followed by a rise of a twelfth to the last attack which points to the direction of the third group. The range of this group is greater than that of the first.

Example 2.8.3

(Klavierstück I, group 2)



Although the sustaining pedal is not depressed in this group the opening ff diad acts as an inverted pedal since it is held throughout the duration of the following four attacks.

Together the first and second groups form a combined group which has as its salient features: a pitch contour which rises

to a peak (the diad $\frac{C}{Db}$) and then descends, the pitches build up chords on the ascent through the use of the pedal and in the descent they give the effect of breaking up a chord to give a high-pitched sound brought off with a very short and loud pitch in the low register of the piano.

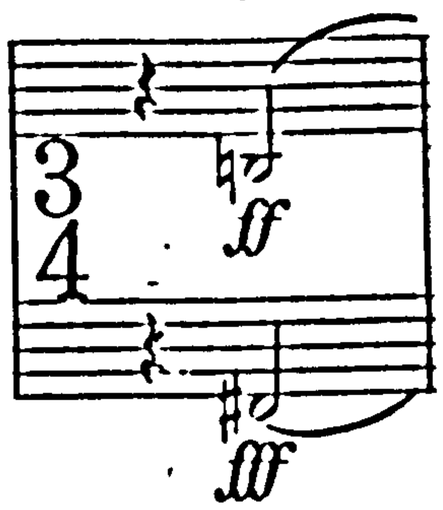
As mentioned in a previous paragraph[23] the diad at the beginning of the second group could just as well be considered the ultimate event in the first group, this being the aural effect. The outcome of this is to lend a unifying feature to the combined group; further unification may be seen in the proximity of the diads to the join between the groups.

Group 3:

This group consists of a single sonority (Example 2.8.4), in the third bar. Played very loudly, the diad contains the interval of a perfect eleventh (F# up to B) sounding a quarter-note after

Example 2.8.4

(Klavierstück I, group 3)



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[23] see p.66

the end of the previous group: it is slurred to the next group. The rapid motion in the first two groups becomes resolved in the stasis of the third.

Group 4:

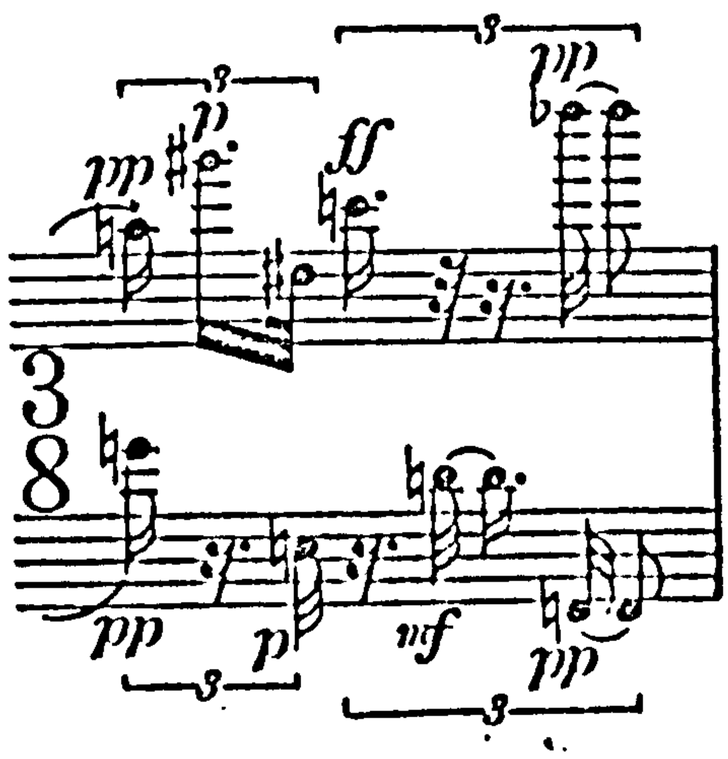
This group (Example 2.8.5), contains six attacks and nine pitches, including three diads. It combines the directional movement of the first two groups, still using large intervals, as follows:-

upper part :

lower part :

Example 2.8.5

(Klavierstück I, group 4)



This group concentrates on the principle tenets of the pointillist experience: the isolation of each note. Each note has a different pitch and contrasting dynamic intensity within the range pp to ff; the notes occur at different time-intervals during the group. The general dynamic intensity is weighted on the quieter side, the tempo is relatively fast, though the durations assigned induce the effect of a slight relaxation towards the end of the group.

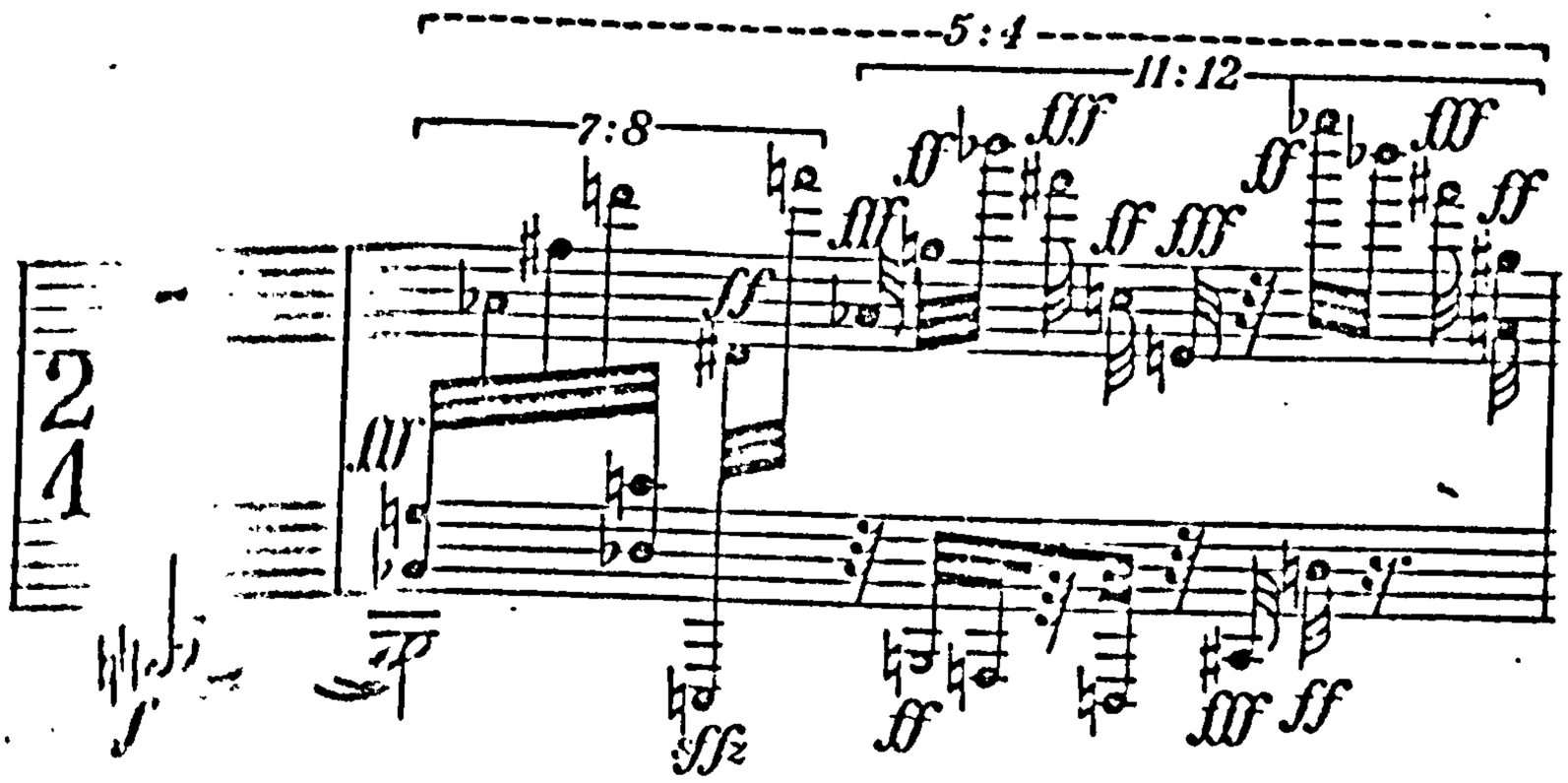
Group 5:

This group (Example 2.8.6), consists of two sub-groups. The first of these starts with a complete contrast to group four: a

low diad bearing a great resemblance to the third group.

Example 2.8.6

(Klavierstück 1, group 5)

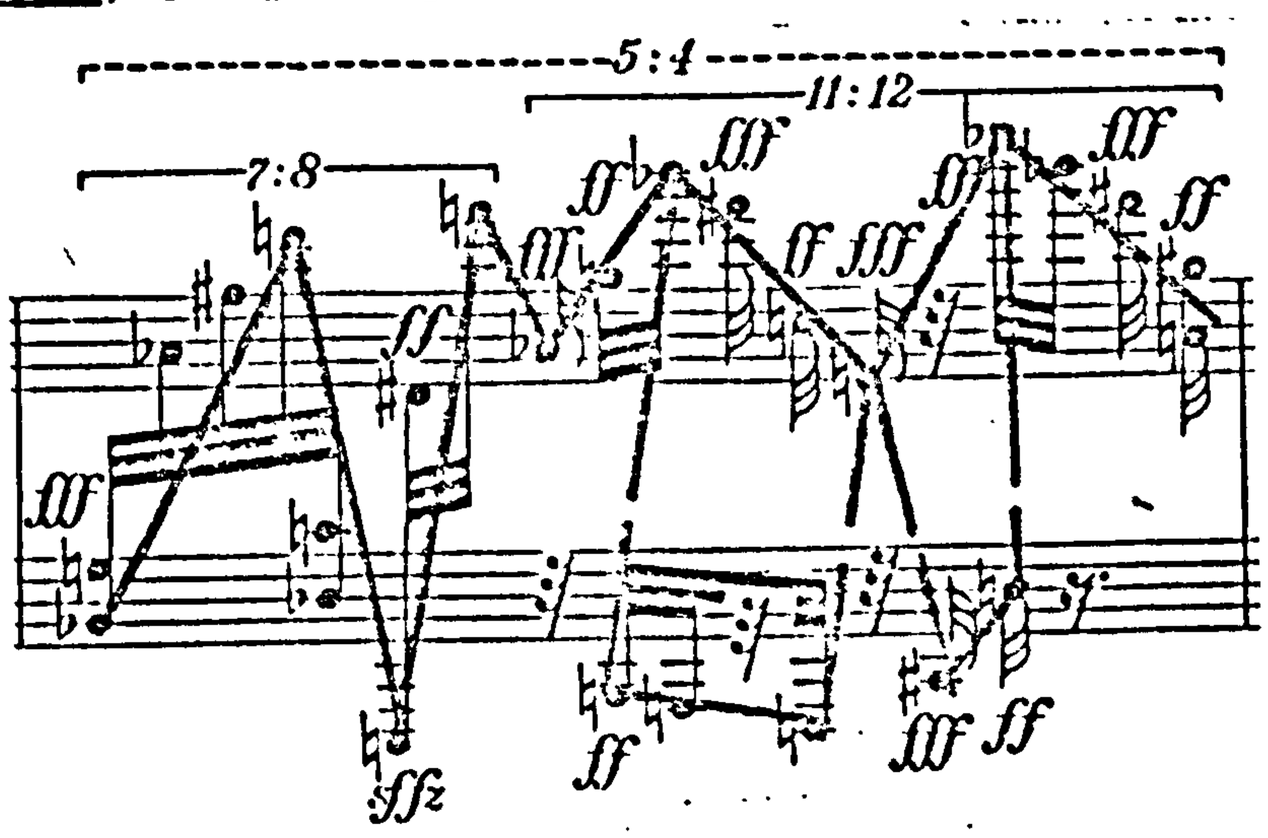


The second sub-group continues the sonority of the low diad from the previous sub-group as a pedal throughout, reinforcing it with very loud and rapid notes above and below, thus inducing the creation of harmonic colouration. This sub-group consists of a flurry of notes within an extremely large range. Each note has approximately the same dynamic intensity and duration: the effect becomes one of a cluster of notes. There is an attack on each of the eighteen divisions of the sub-group (as opposed to only one in the previous sub-group). There are twenty-six pitches which give an overall pitch-contour of: ascent, ascent, ascent, descent, descent, (Example 2.8.7). Each time a movement begins, except at the transition (T), it backtracks in direction. The remaining notes in the bottom register (Bb,Db,E,B,A,F,D,) form diads against the motion above.

There is a slight variance in dynamic intensity in this sub-group from ff to fff.

Example 2.8.7

(Klavierstück I, group 5: pitch contour)

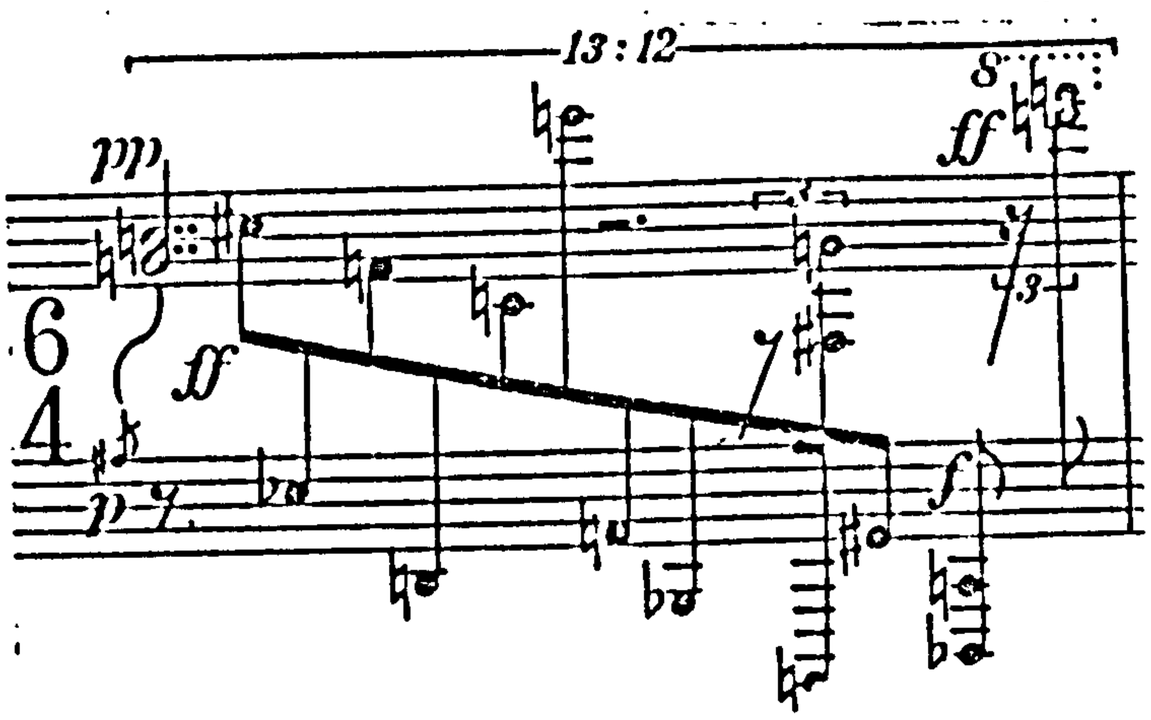


Group 6:

The sixth group (Example 2.8.8) consists of bar seven and contains two different elements occurring in the same time-area.

Example 2.8.8

(Klavierstück I, group 6)



A sustained major third is heard, pp, in the middle register to begin with. It is followed by twelve attacks, ff, with, towards the end, a triad and two diads. The descending figure at the close of the previous group may be said to be continued three times over in this group. The closing diad in group six contains the highest pitch yet in the piece, D.

Groups five and six balance each other[24] with contrasts between

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[24] as do groups one and two, three and four

the quick irregular patters of group five and the slower more equal configuration of group six.

From above it is possible to see that the first six groups form a super-group, which might be divided into two segments, of two and four groups respectively.

These six groups form the basic blocks with which the whole of the structure of Klavierstücke I-IV is built. This will be tested by comparison with the ensuing six groups of Klavierstück I.

Group 7:

The seventh group (Example 2.8.9), first group of the second super-group, is derived from group six: it is located in bar eight.

Example 2.8.9

(Klavierstück I, group 7)

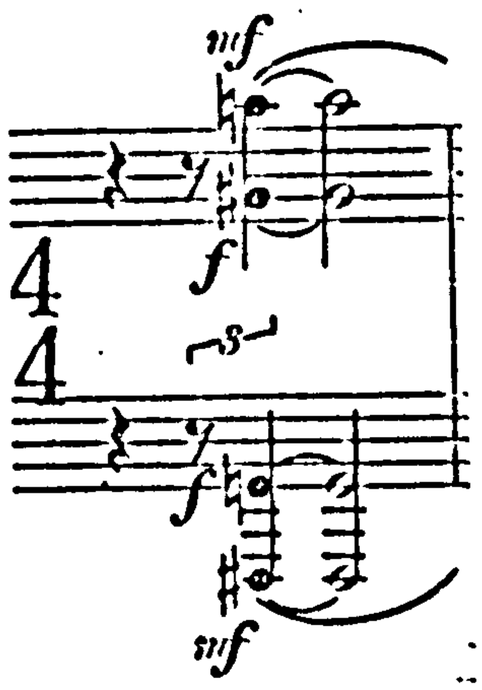
It consists of a held pitch against which two layers of pitches are heard in a regular duration-sequence with the predominant dynamic intensity - mf. If the held pitch were to be disregarded the ensuing pattern could be likened to that occurring in the fourth group of the first super-group. Since the average dynamic intensity (mf) is roughly equal to that of the first group and the duration is the equivalent of three quarter-notes (group 3), then

the seventh group can also be said to be related to both groups. Hence it follows that the seventh group derives overall duration from group three, dynamic intensity from group one, overall range and pointillist approach from group four, envelope and sustained note from group six, and, with the exception of the last note, compass from group two.

Group 8:

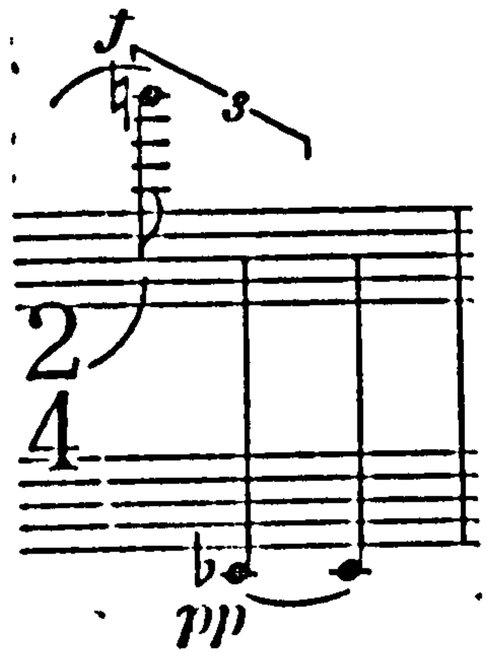
Example 2.8.10

(Klavierstück I, group 8, first sub-group)



Example 2.8.11

(Klavierstück I, group 8, second sub-group)



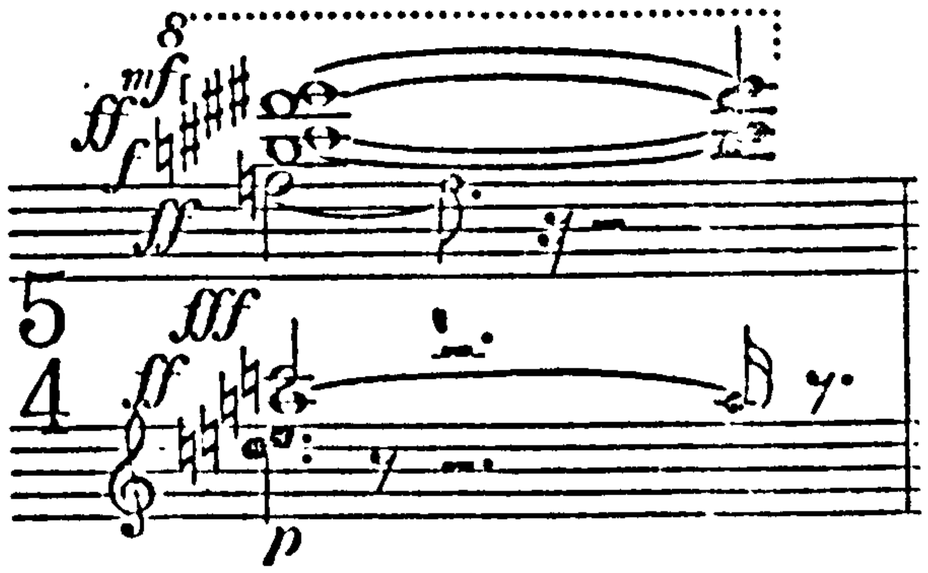
The first sub-group of the eighth group (Example 2.8.10) consists of a single sonority played forte which is linked by a slur to the next sub-group. Obvious affinities with the third group and first sub-group of the fifth group may be seen. The compass of the third group is a perfect fourth, that of the fifth (first sub-group) is a tone: the difference is a minor third - the range of the tetrad-cluster forming the eighth group (first sub-group). A further connection with the third group of the first super-group is the caesura before the attack.

The second sub-group of the eighth group (Example 2.8.11) is an extension consisting of the large interval of four octaves and a tritone from B down to Eb.

Group 9:

Example 2.8.12

(Klavierstück I, group 9)



This group (Example 2.8.12) is to be found in bar eleven and seems to present a novel process. However, on further consideration its incipient sonority and decay, if reversed, will present the same offect as groups one or two in retrograde. Since its duration is the same as group one this is its equivalent group in the first super-group.

Group 10:

Example 2.8.13

(Klavierstück I, group 10)

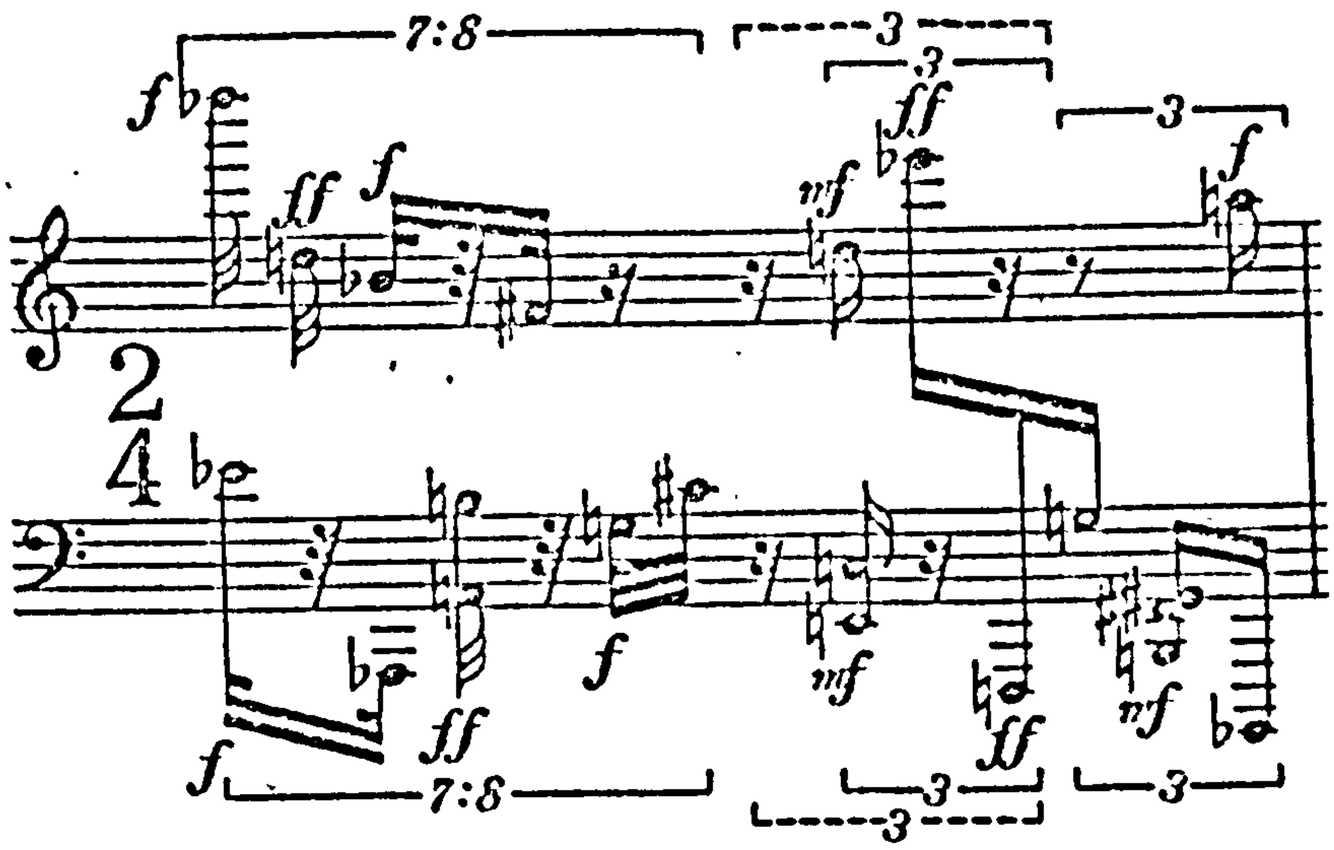
This group (Example 2.8.13) is very pointillist in appearance, containing four attacks (one diad) with widely differing dynamic intensities (pp to fff), and irregular gaps between attacks. The compass of almost two octaves contains two large intervals with pitch-contour: descent, ascent. Similarities between group ten and the lower segment of group four are immediately apparent although the

intervals in the latter are larger.

Group 11:

Example 2.8.14

(Klavierstück I, group 11)

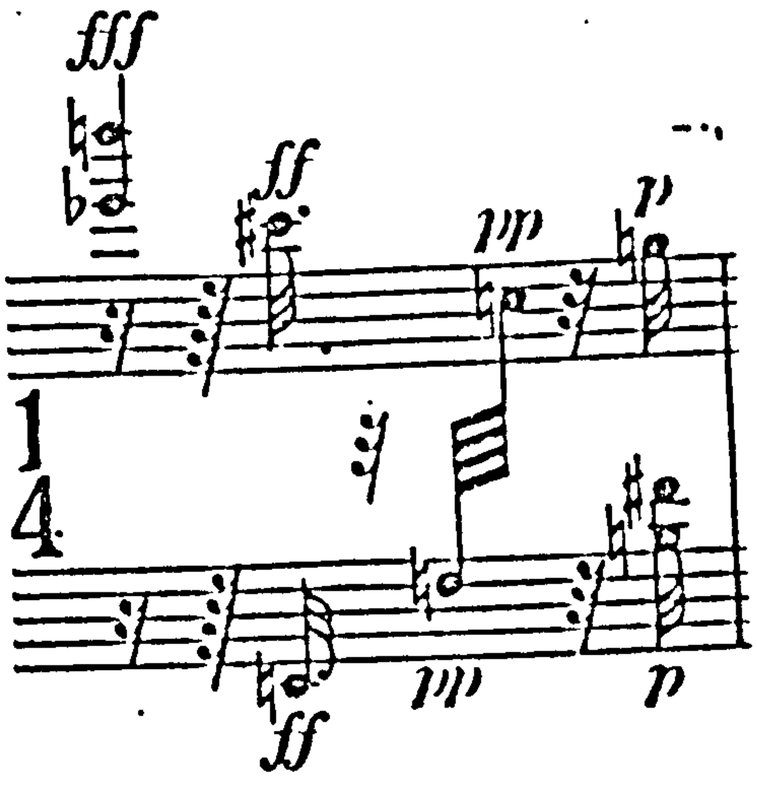


This group (Example 2.8.14) corresponds to the fifth group's second sub-group; there being no pedal present is the difference. The compass is approximately the same, the duration is the same and the dynamic intensity of group eleven is slightly reduced: being more akin to that of group two.

Group 12:

Example 2.8.15

(Klavierstück I, group 12)



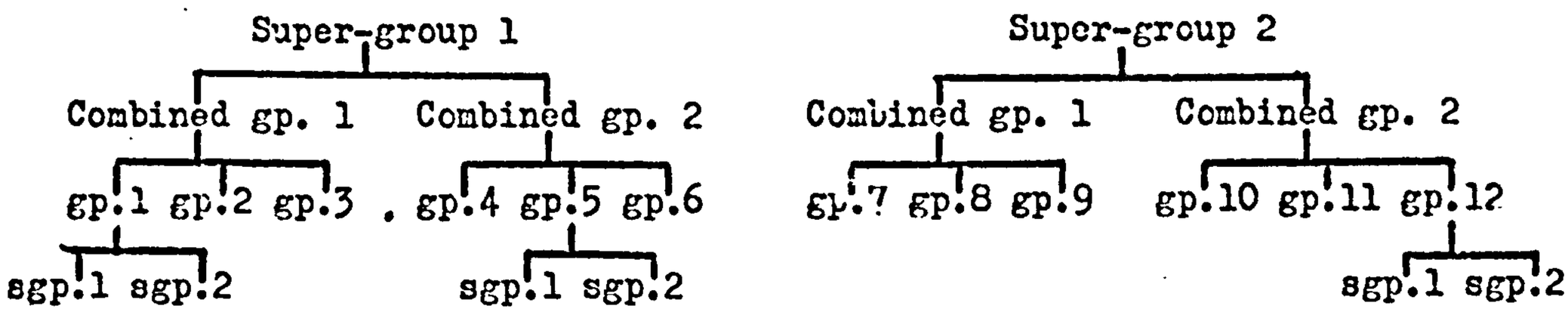
This group (Example 2.8.15) has great similarities with group two. The high pedal diad struck at the beginning, approximately

the same pitch and dynamic intensity contours, the same rhythmic hiatuses: all these add up to justifiable comparison between the two groups. From the aspect of dynamic intensity the twelfth group may be said to possess two sub-groups: the very loud and the soft; each having an opposing dynamic intensity gradient.

From the above analysis it may be seen that the first six groups are reflected in the ensuing six. Each of groups seven to twelve having one predominant and several subsidiary properties of groups one to six. From this analysis an hierarchical structuration in Klavierstück I may be induced (Example 2.8.16), as may the preeminent group-to-group relationships (Example 2.8.17). Were this analysis to continue super-groups one and two would be seen to possess an hierarchical relationship to the subsequent super-groups in much the same way as the combined groups and ordinary groups do; this dependence on the first six groups of Klavierstück I is to be seen throughout the rest of this set of piano compositions.[25]

Example 2.8.16

(Klavierstück I, hierarchical structuration of groups 1 to 12)



(gp. - group; sgp. - sub-group)

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25 An analysis of Klavierstück III which verifies this and further symmetry may be found in die Reihe volume 4; Karlheinz Stockhausen: Dieter Schnebel, pps. 122 - 123 and 126 - 131.

Example 2.8.17

(Klavierstück I, group relationships)

Group	1	2	3	4	5	6	7	8	9	10	11	12
Equivalent Group							6	3	1	4	5	2
Duration (in ♩)	5	2	3	1½	4	6	3	6	5	4	2	1
Duration of super-groups (in ♩)	21½						21					

2.9 Elektronische Studien I and II nr. 3

(Electronic Studies 1 and 2)

Year of composition : 1953

Forces required : electronic tape for performance (scores contain all the information necessary to create the tape)

First performance : N.W.D.R. (Cologne), 19th October, 1954

Commissioned by : N.W.D.R. (Cologne)[26]

Duration : 9 m. 30 s. and 3 m.

In both of these electronic studies Stockhausen has organized all the different parameters in a very rigorous fashion. Electronically these compositions use two primary sources of sound: the simple sine-wave

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26 The two electronic studies were written in the studios attached to N.W.D.R. (Cologne).

(which can undergo such operations as sum-difference and superimposition) and white noise (which may be filtered into differently coloured bands. The end result is an homogenous confusion of the basic sounds and structures. It was Stockhausen's specific intention in Elektronische Studien to preclude any sonorities which might be generated by the instrumentalists of the mid-fifties. Throughout his music of this period it is possible to discern a subtle distinction between the ways in which he considered sound material: as he wrote in 1955:-

> "Es wird nicht mehr heissen: instrumentale Musik ODER elektronische Musike, sondern: instrumentale Musik UND elektronische Musik. Jede dieser Klangwelten hat ihre eigenen Bedingungen, ihre eigenen Grenzen."[27]

These two works represent Stockhausen's first real essay into the realm of electronically synthesized music; discounting his attempts at Paris.[28] They were both completed within a few weeks of his joining the staff at Cologne Radio's studios.

As previously mentioned these compositions are both constructed with extremely rigorously organized parameters: a further consideration of the processes as applied to Elektronische Studie II follows.[29]

Since Stockhausen has already provided an explanation of

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27 Texte, Band II, p. 43

We must no longer think of instrumental music OR electronic music, rather of instrumental music AND electronic music. Each of these sound-domains has its own diatheses and its own limitations.

28 see p. 54

29 for an analysis of Elektronische Studie I see Texte, Band II, pps. 23 - 36

Elektronische Studie II,[30] this analysis will provide a summary of the techniques used, other than the editing of the tape; their application within the idea of the group will be seen here and in Klavierstücke V - VIII.[31]

Having selected a scale of transformation of pitch from 100 Hz. to 17.2 kHz. with 81 steps each approximately in ratio to the next by a factor of $\sqrt[25]{5}$,[32] Stockhausen then took each such frequency and generated above it four other frequencies with similar ratios. This created sets of five pitches, frequency-clusters,[33] each with their overtone possibilities (Example 2.9.1). A total of 193 of these groups resulted which were interrelated as in the diagram (Example 2.9.2).

A relative dynamic intensity scale was established from 0dB to -30dB. H is a relative dynamic intensity scale because, as Stockhausen wrote:-

> "Die Abhörtlautstärke 0dB richtet sein je nach der Grösse des Raumes, soll abernicht geringer als ca. 80 Phon sein." [34]

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30 Texte, Band II, pps. 37 - 42

Elektronische Studie II pps. IV - VIII (published as U.E. 12466);

31 see p. 83

32 approximately, since Stockhausen rounded the figures to the nearest integer.

33 frequency-cluster is chosen rather than overtone-spectrum as the latter has too many tonal and instrumental connotations.

34 Texte, Band II, p. 39

"The loudness of 0dB is dependant upon the size of the room, but should be no less than 80 Phon."

Example 2.9.1

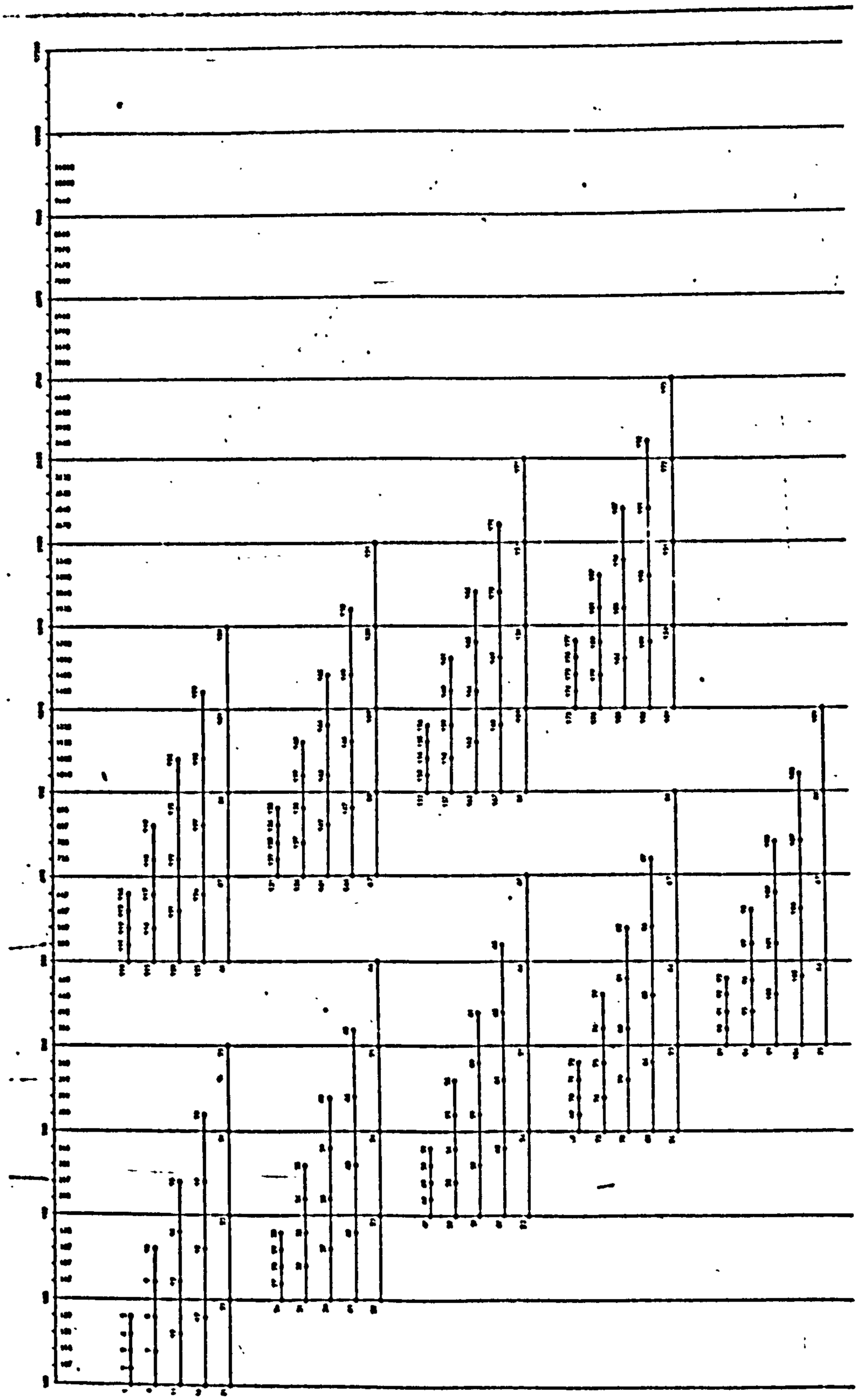
(Elektronische Studie II, Frequency table)

4	100	107	114	121	129	26	138	147	157	167	178	47	190	203	217	231	246	68	263	280	299	319	340	89	362	386	412	440	469
5	107	114	121	129	138	27	147	157	167	178	190	48	203	217	231	246	263	69	280	299	319	340	362	90	386	412	440	469	500
3	114	121	129	138	147	28	157	167	178	190	203	49	217	231	246	263	280	70	299	319	340	362	386	91	412	440	469	500	533
4	121	129	138	147	157	29	167	178	190	203	217	50	231	246	263	280	299	71	319	340	362	386	412	92	440	469	500	533	569
5	129	138	147	157	167	30	178	190	203	217	231	51	246	263	280	299	319	72	340	362	386	412	440	93	469	500	533	569	607
6	100	114	129	147	167	31	138	157	178	203	231	52	190	217	246	280	319	73	263	299	340	386	440	94	362	412	469	533	607
7	114	129	147	167	190	32	157	178	203	231	263	53	217	246	280	319	362	74	299	340	386	440	500	95	412	469	533	607	693
8	129	147	167	190	217	33	178	203	231	263	299	54	246	280	319	362	412	75	340	386	440	500	569	96	469	533	607	690	78·
9	147	167	190	217	246	34	203	231	263	299	340	55	280	319	362	412	469	76	386	440	500	569	647	97	533	607	690	785	89·
10	167	190	217	246	280	35	231	263	299	340	386	56	319	362	412	469	533	77	440	500	569	647	736	98	607	690	785	893	1010
11	100	121	147	178	217	36	138	167	203	246	299	57	190	231	280	340	412	78	263	319	386	469	569	99	362	440	533	647	785
12	121	147	178	217	263	37	167	203	246	299	362	58	231	280	340	412	500	79	319	386	469	569	690	100	440	533	647	785	952
13	147	178	217	263	319	38	203	246	299	362	440	59	280	340	412	500	607	80	386	469	569	690	837	101	533	647	785	952	1150
14	178	217	263	319	386	39	246	299	362	440	533	60	340	412	500	607	736	81	469	569	690	837	1010	102	647	785	952	1150	1400
15	217	263	319	386	469	40	299	362	440	533	647	61	412	500	607	736	893	82	569	690	837	1010	1230	103	785	952	1150	1400	1700
16	100	129	167	217	280	41	138	178	231	299	386	62	190	246	319	412	533	83	263	340	440	569	736	104	362	469	607	785	1010
17	129	167	217	280	362	42	178	231	299	386	500	63	246	319	412	533	690	84	340	440	569	736	952	105	469	607	785	1010	1310
18	167	217	280	362	469	43	231	299	386	500	647	64	319	412	533	690	893	85	440	569	736	952	1230	106	607	785	1010	1310	1700
19	217	280	362	469	607	44	299	386	500	647	837	65	412	533	690	893	1150	86	569	736	952	1230	1590	107	785	1010	1310	1700	2200
20	280	362	469	607	785	45	386	500	647	837	1080	66	533	690	893	1150	1490	87	736	952	1230	1590	2060	108	1010	1310	1700	2200	2840
21	100	138	190	263	362	46	500	690	952	1310	1810	67	690	952	1310	1810	2500	88	952	1310	1810	2500	3450	109	1310	1810	2500	3450	4760
22	138	190	263	362	500																								
23	190	263	362	500	690																								
24	263	362	500	690	952																								
25	362	500	690	952	1310																								

110	500	533	569	607	647	131	690	736	785	837	893	152	952	1010	1080	1150	1230	173	1310	1400	1490	1590	1700
111	533	569	607	647	690	132	736	785	837	893	952	153	1010	1080	1150	1230	1310	174	1400	1490	1590	1700	1810
112	569	607	647	690	736	133	785	837	893	952	1010	154	1080	1150	1230	1310	1400	175	1490	1590	1700	1810	1930
113	607	647	690	736	785	134	837	893	952	1010	1080	155	1150	1230	1310	1400	1490	176	1590	1700	1810	1930	2060
114	647	690	736	785	837	135	893	952	1010	1080	1150	156	1230	1310	1400	1490	1590	177	1700	1810	1930	2060	2200
115	500	569	647	736	837	136	690	785	893	1010	1150	157	952	1080	1230	1400	1590	178	1310	1490	1700	1930	2200
116	569	647	736	837	952	137	785	893	1010	1150	1310	158	1080	1230	1400	1590	1810	179	1490	1700	1930	2200	2500
117	647	736	837	952	1080	138	893	1010	1150	1310	1490	159	1230	1400	1590	1810	2060	180	1700	1930	2200	2500	2840
118	736	837	952	1080	1230	139	1010	1150	1310	1490	1700	160	1400	1590	1810	2060	2340	181	1930	2200	2500	2840	3230
119	837	952	1080	1230	1400	140	1150	1310	1490	1700	1930	161	1590	1810	2060	2340	2670	182	2200	2500	2840	3230	3680
120	500	607	736	893	1080	141	690	837	1010	1230	1490	162	952	1150	1400	1700	2060	183	1310	1590	1930	2340	2840
121	607	736	893	1080	1310	142	837	1010	1230	1490	1810	163	1150	1400	1700	2060	2500	184	1590	1930	2340	2840	3450
122	736	893	1080	1310	1590	143	1010	1230	1490	1810	2200	164	1400	1700	2060	2500	3030	185	1930	2340	2840	3450	4180
123	893	1080	1310	1590	1930	144	1230	1490	1810	2200	2670	165	1700	2060	2500	3030	3680	186	2340	2840	3450	4180	5080
124	1080	1310	1590	1930	2340	145	1490	1810	2200	2670	3230	166	2060	2500	3030	3680	4460	187	2840	3450	4180	5080	6160
125	500	647	837	1080	1400	146	690	893	1150	1490	1930	167	952	1230	1590	2060	2670	188	1310	1700	2200	2840	3680
126	647	837	1080	1400	1810	147	893	1150	1490	1930	2500	168	1230	1590	2060	2670	3450	189	1700	2200	2840	3680	4760
127	837	1080	1400	1810	2340	148	1150	1490	1930	2500	3230	169	1590	2060	2670	3450	4460	190	2200	2840	3680	4760	6160
128	1080	1400	1810	2340	3030	149	1490	1930	2500	3230	4180	170	2060	2670	3450	4460	5770	191	2840	3680	4760	6160	7970
129	1400	1810	2340	3030	3920	150	1930	2500	3230	4180	5410	171	2670	3450	4460	5770	7470	192	3680	4760	6160	7970	10300
130	1810	2500	3450	4760	6570	151	2500	3450	4760	6570	9060	172	3450	4760	6570	9060	12500	193	4760	6570	9060	12500	17200

Example 2.9.2

(Elektronische Studie II, Pitch-group chart of frequencies)



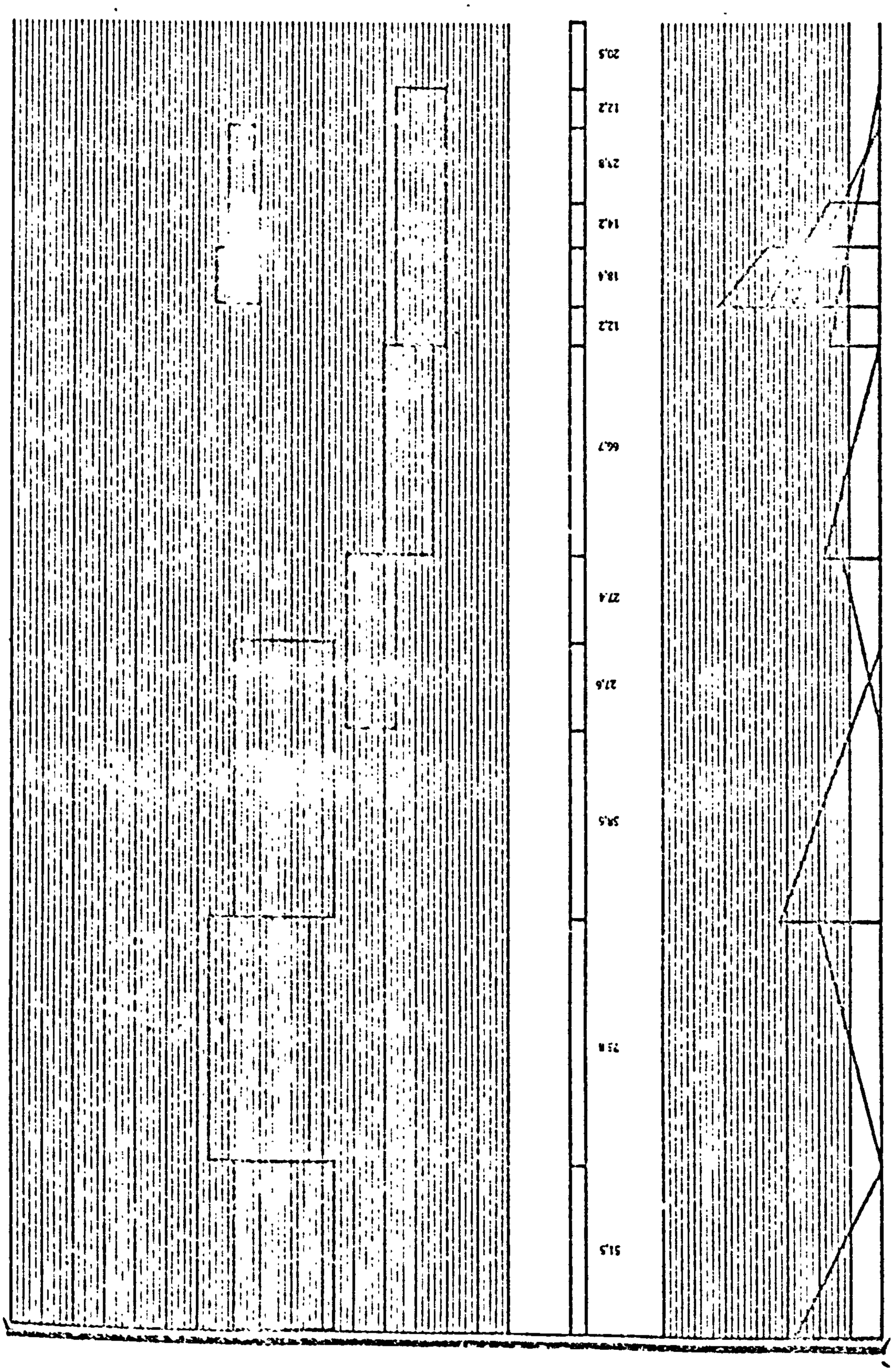
Each overtone has the same dynamic intensity, but the overall envelope may vary between -40dB and 0dB/-30dB; -40dB being inaudible.

The duration of each sonority will be determined by the particular length of tape used for its production.

Since the score consists of two graphs with the same abscissa of duration/length of tape (measured in s. or cm.), but with different ordinates, one of frequency (measured in Hz) and the other of loudness (measured in dB), then a brief explanation of a few groups will be of use. On page 8 (Example 2.9.3), group 10 has already started its first sub-group, on page 9. The second element of this first sub-group begins with an opening frequency spread from 607 Hz to 1700 Hz which is equivalent to frequency-cluster nr. 106 (Example 2.9.1). This starts with a relative dynamic intensity of -21dB and decays to -40dB in approximately 0.67 s. This is followed by frequency-cluster nr. 107 which rises in dynamic intensity from -40dB to -25dB in just under a second. The fourth element heralds an immediate change to -19dB for the return of frequency-cluster nr. 106 lasting for c. 1.13 s. and decaying to -40dB. After c. 0.77 s. of this element has elapsed the second sub-group begins with frequency-cluster nr. 56; the dynamic intensity rises from -40dB to -29dB in c. 0.73 s.: the duration of the overlap between sub-groups being c. 0.35 s. The second element is frequency-cluster nr. 53, dynamic intensity falling from -26dB to -40dB in c. 0.87 s. The last element in this sub-group lasts for c. 1.06 s., its frequency-cluster is nr. 52 and it gets softer from -27dB to -40dB. The third sub-group enters after c. 0.16 s. and consists of three elements all starting simultaneously. The first of these is of frequency-cluster nr. 176, lasts for c. 0.24 s. and diminuendos from -9dB to -17dB. The second is of frequency-cluster nr. 173, lasts for c. 0.43 s. and diminuendos from -17dB to -27dB. The third element is of frequency-cluster nr. 174, lasts for c. 0.74 s. and

Example 2.9.3

(Elektronische Studie II, group 10)



diminuendos from -21dB to -40dB. The effect of this last sub-group is a gentle diminuendo of a low pitch-mixture against which an explosion of high-pitched sound occurs in a short space of time.

Within the three minutes it takes for Elektronische Studie II to be played there are some 94 groups which are separated by zones of silence of varying lengths. No tone-mixture maintains a constant dynamic intensity, the effect is always one of crescendo or diminuendo.

2.10 Klavierstücke V - VIII nr. 4 (a-d)

(Piano pieces V - VIII)

Year of composition	:	1954 - 1955
Forces required	:	piano
Dedicated to	:	David Tudor
First performance	:	Darmstadt, 1st June, 1955
Commissioned by	:	The town of Darmstadt
Duration	:	c. 6 m. c. 26 m. c. 7 m. c. 2 m.

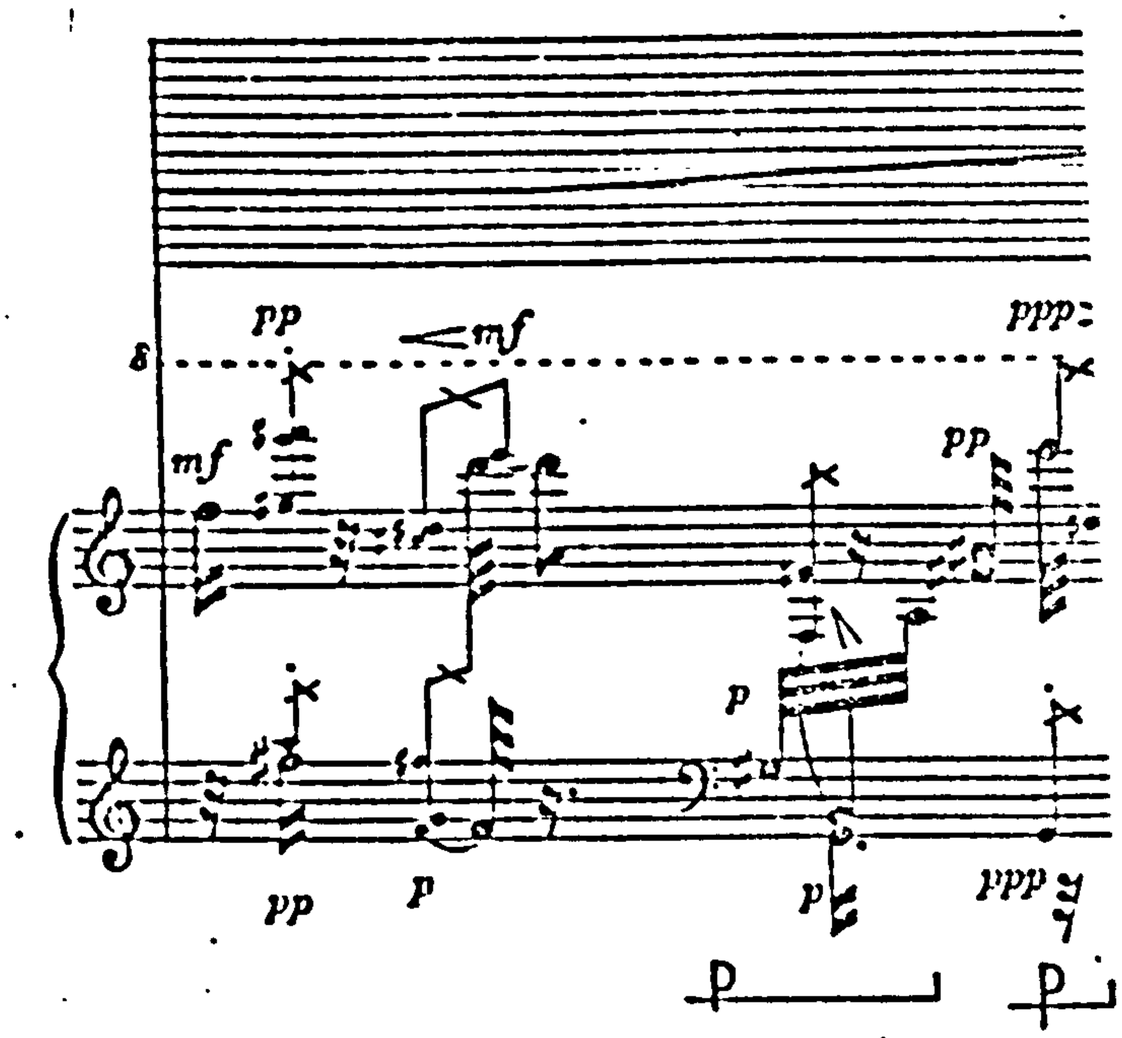
Following the composition of the two Studies, Stockhausen returned to standard instruments in Klavierstücke V - XI, Zeitmasse and Gruppen. Having experienced the ease with which magnetic-tape could be cut, spliced and edited to realize precisely the composer's wishes, Stockhausen decided an attempt ought to be made to transfer these techniques back to the realm of conventional instruments.

In these four piano pieces Stockhausen has used several new notational procedures. Firstly, the actual spacing of the notes on the page is used as an indication of the time-intervals between attacks. Secondly, in Klavierstück VI Stockhausen uses a graph above the musical system to portray tempi changes within a 1:4 field from ♩ = 45 through 50.5; 57; 63.5; 71; 80; 90; 101; 113.5; 127; 142; 160 to ♩ = 180: thirteen elements in all. (Example 2.10.1) Further symbolology may

be found in the introduction to each of the four pieces.

Example 2.10.1

(Klavierstück VI, beginning)



Before considering one of the four pieces in more detail it will be of value to make a general observation regarding the similarities among the four pieces. The scale of transformation of tempi[35] used in Klavierstück VI has elements which are used in the other three members of this set, as may be seen in the following diagram (Example 2.10.2): the diagram also shows that, with regard to tempo, these four pieces may be divided into three groups: Klavierstück V, Klavierstück V? and Klavierstücke VII - VIII.

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35 This scale of transformation is constructed in the following way: let the first element be $\underline{n}$, then the next elements will be $\underline{n} + \underline{n}^6$ 2, the third $\underline{n} + 2\underline{n}^6$ 2. A further scale of transformation of tempi will be encountered when Gruppen is considered - that of $\sqrt[12]{2}$;
see p.110

Example 2.10.2

(Diagram of tempi in Klavierstücke V - VIII)

Piece	Tempi													
Klavierstück V*					63.5	71	80	90	101	113.5				
Klavierstück VI		45	50.5	57	63.5	71	80	90	101	113.5	127	142	160	180
Klavierstück VII**	40		50.5	57	63.5	71								
Klavierstück VIII**							80	90						

* these values may be slightly transposed, but not as much as would give them a value within the range of the next element.

** If Klavierstücke VII and VIII are played together Stockhausen states that the overall tempo may be varied up or down one element, the lowest tempo of Klavierstück VII then becoming ♩ = 35.5.

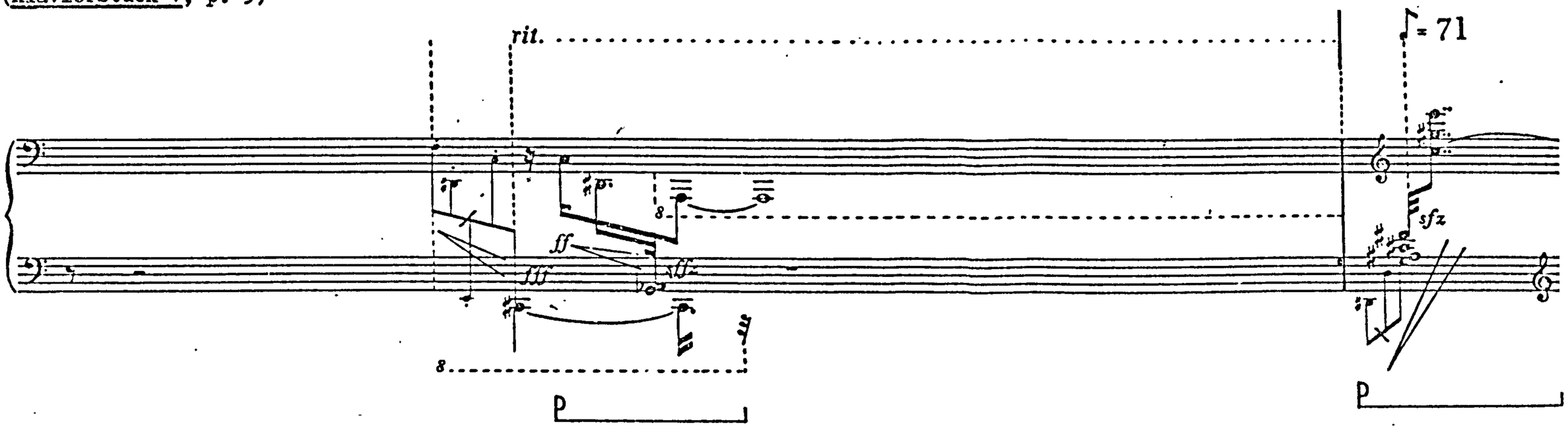
Throughout the second set of piano pieces (V - X) it becomes easier and easier to perceive the overall structure, rather than the local formation. The basic types of material encountered become highly differentiated and are isolated from each other by means of an increasing use of silence. This being the case, Klavierstück V, Stockhausen's first mature work, will be considered here as it begins the sequence.

Three general observations are worthy of mention: all of which can easily be verified by consulting the score. Firstly, as the work progresses the use of silence as a compositional tool becomes more and more evident - this is most obvious if one compares pages 1 and 11 of the score. Secondly, each section of the composition is made up of several groups. Thirdly, the work as a whole sounds like a recitative.

Before considering each section and its internal structure the three main features of Klavierstück V must be touched on. The first is the use of long sustained single pitches as on page 5 (Example 2.10.3).

Example 2.10.3

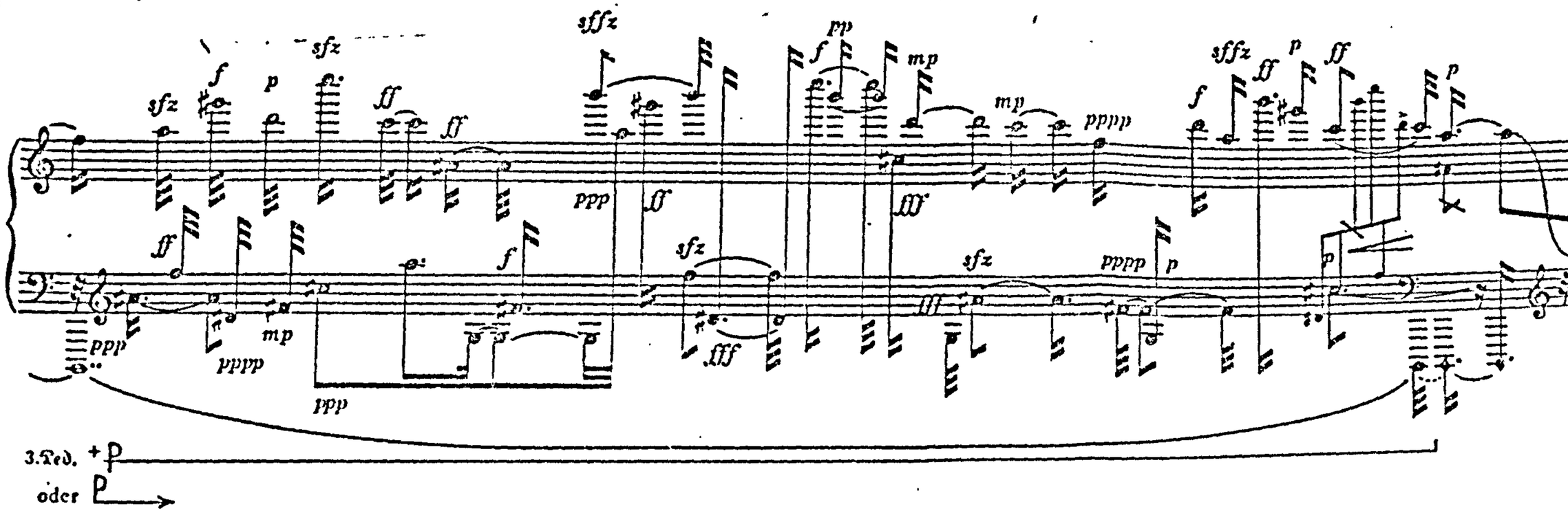
(Klavierstück V, p. 5)



The second is the occurrence of complicated contrapuntal episodes such as that on page 6 (Example 2.10.4). The third is the sudden eruption of very fast chords, often violently, as on page 1 (Example 2.10.5). Each of these features has an independent climax during the course of the piece: thus it is possible to consider the overall form as one of three interlocking oscillations.

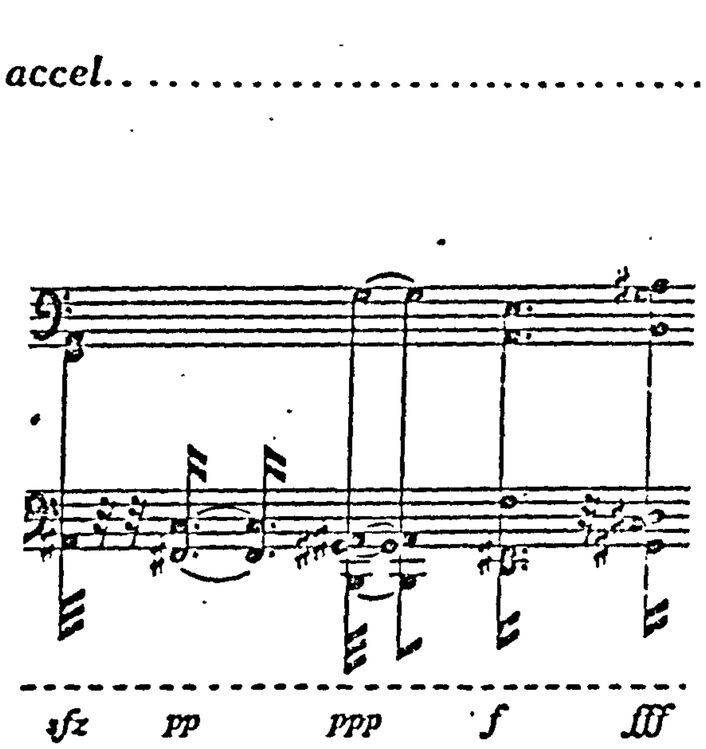
Example 2.10.4

(Klavierstück V, page 6)



Example 2.10.5

(Klavierstück V, p. 1)



Apart from those already mentioned, the only other general aspect of Klavierstück V that needs to be mentioned here is the great use made of grace-notes to ensure rhythmic interest without the use of

rational notation:

> "a system of grace-notes whose rhythmic profile is determined by the dexterity of the performer and the expressive demands of their context"[36]

Klavierstück V falls into six sections. The first (A), runs from the beginning to the end of the top line of page 2; the second (B), from the beginning of the second line on page 2 to the end of the sustained pitch A on the top line of page 5; the third (C) from the grace-note pattern at the end of that top line to the end of the top line on page 6; the fourth (D) from the ♩ = 113.5 on page 6 to the end of the first ritardando on page 7; the fifth (E) from the ♩ = 101 on page 7 to the end of the molto ritardando on page 9; and the sixth (F) from the ♩ = 63.5 on page 9 to the end of the work. If the separate durations of these are added up along with the number of eighth-notes per group, the following table is produced (Example 2.10.6).

Example 2.10.6

(Table)

Group	A	B	C	D	E	F
Duration (s.)	45	70	32	13	50	90
Number of ♩	60	104	38	24	84	95
Number of attacks/s.	2.11	1.86	3	3.33	1.75	1

From this table it is possible to derive, in absolute terms, a density contour from section to section (Example 2.10.7). As might be expected this starts relatively active, relaxes, activity increases and then dies away - an extremely satisfactory solution from the emotional point of view.

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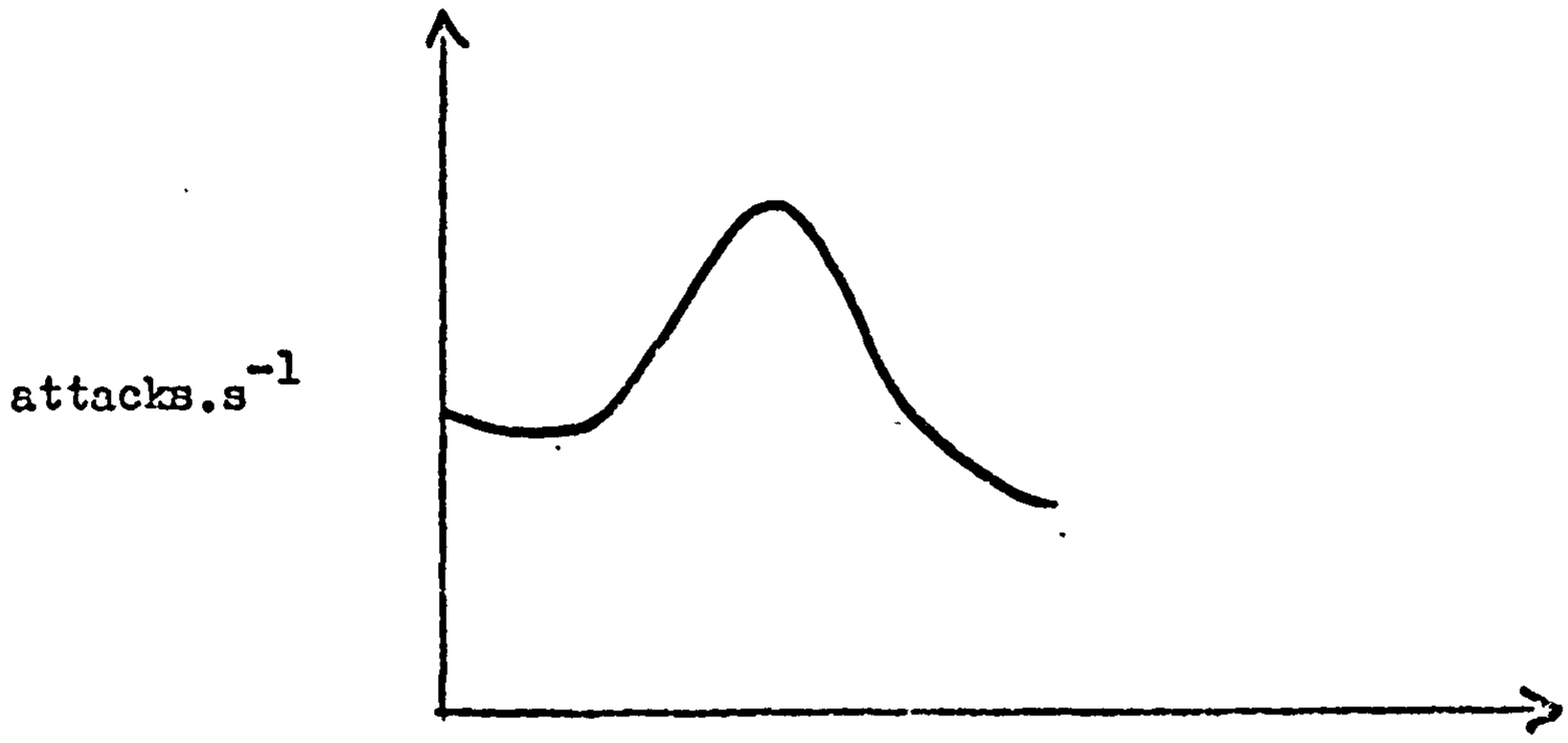
36 Stockhausen's Piano Pieces, Roger Smalley, "The Musical Times", 1969, p. 31.

Example 2.10.7

(Density contour)

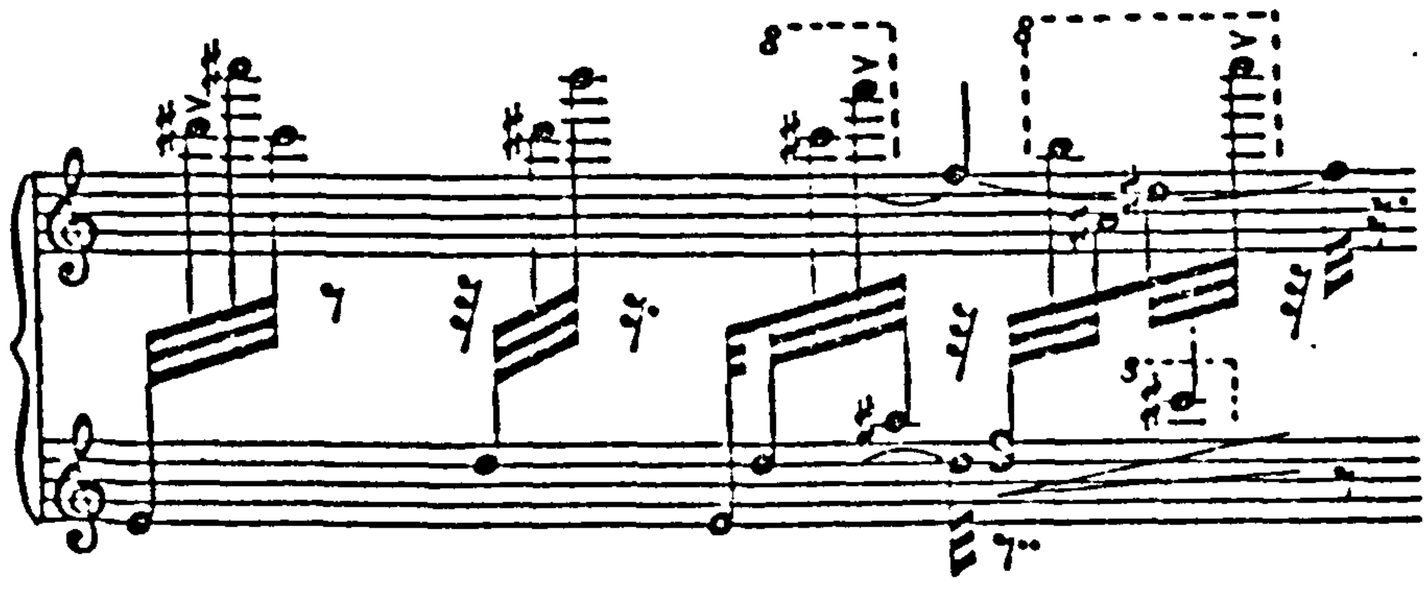


Within Klavierstück V there are three different sorts of vertical groups:-

1. Those written mostly as thirty-second-notes in an arpeggio-like formation using between 9 and 18 pitches, (Example 2.10.8).

Example 2.10.8

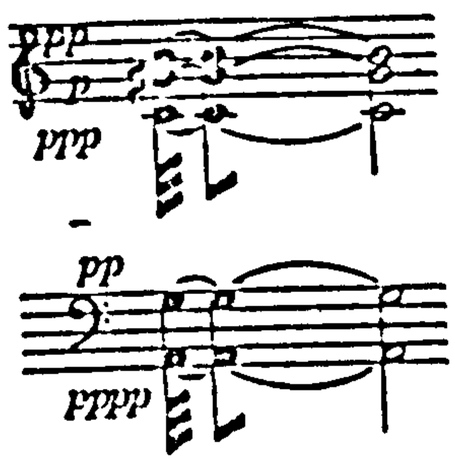
(Klavierstück V, p.1)



2. Solitary quasi-romantic chords, rather Bergian in sound, in the middle range of the piano, (Example 2.10.9).

Example 2.10.9

(Klavierstück V, p. 1)



3. Short densely packed chords in the lower register of the piano, with varying dynamic intensities and durations, (Example 2.10.10).

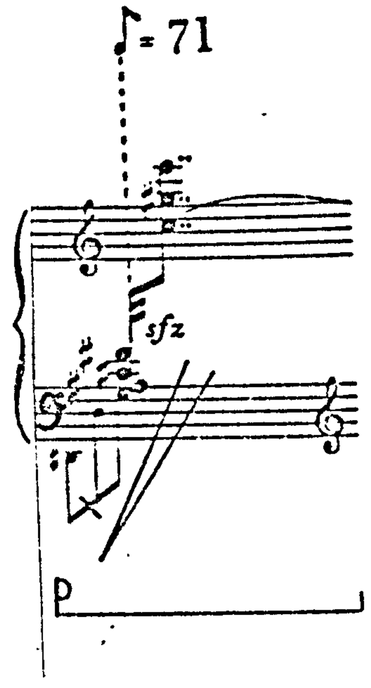
Example 2.10.10

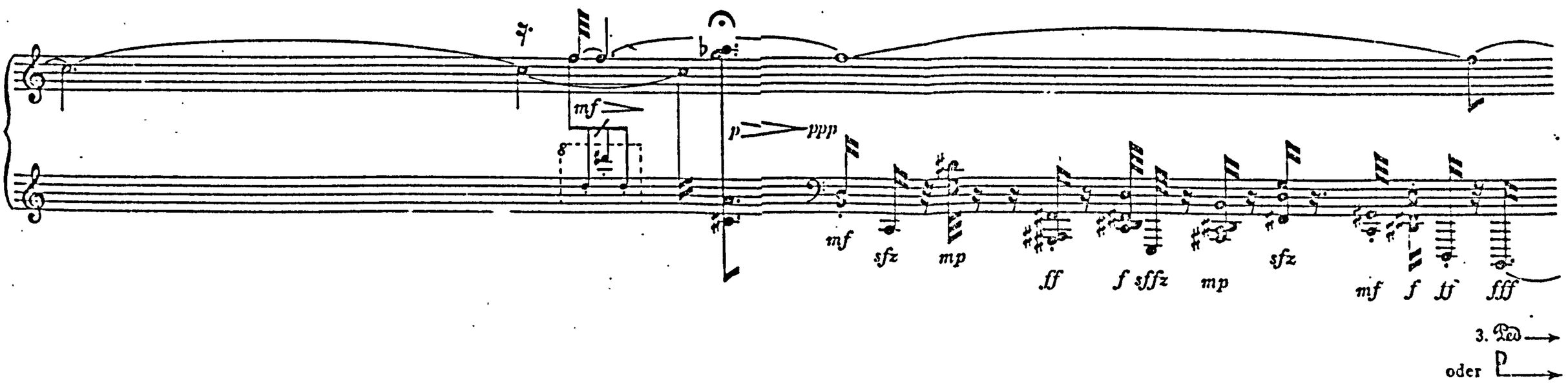
(Klavierstück V, p. 5)

Within section C various group effects may be encountered (Example 2.10.11). The section begins with two grace-notes followed by two chords in the style of the third main feature. This is followed by the isolated pitch C, sustained from the previous chord. After another held note, F, against which grace-notes are played, a "vertical group" chord is played under a caesura, the F still being sustained. Superimposed on this F there is a section related to (3) above. Bottom B is then played fff and sustained by means of the "third" pedal throughout a 47-note contrapuntal complex. A held pitch A followed by grace-notes and a high B lead into section D, the shortest temporally, though the one with the highest rate of attacks. It consists quite simply of grace-notes

Example 2.10.11

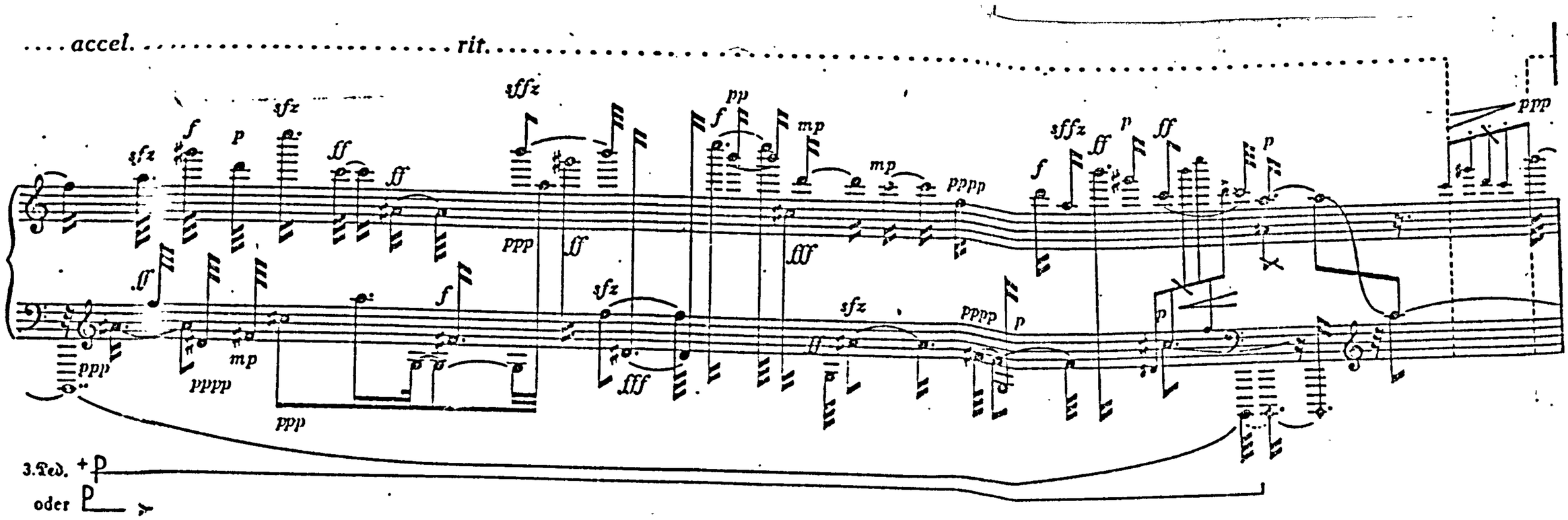
(Klavierstück V, pps. 5 and 6)





Example 2.10.12

(Klavierstück V, pps. 5 and 6)



leading to a held A♯ against which a chord of type (2) is struck and also sustained (a combination of (2) with the feature of the sustained note). This is followed by a complex melodic passage which degenerates into a sustained major third $\overset{C\,\sharp}{A}$, a held G♯ with grace-notes and the beginning of section E.

As may be seen, the division of the piece into sections takes place concomitant with the change in metronome marking: it is worth mentioning that a transition from group (group-complex[37]) to group (group-complex) is usually heralded by a fluctuation in tempo.

2.11 Klavierstücke IX - X nr. 4 (e - f)

(Piano pieces IX - X)

Year of composition	:	1954 (revised in 1961)
Forces required	:	piano
Dedicated to	:	Aloys Kontarsky
First Performance	:	IX - W.D.R. Cologne, 21st May, 1962 X - Palermo Festival, 10th October, 1962
Commissioned by	:	X - Radio Bremen
Duration	:	c. 10 m.; c. 23 m.

Both these pieces belong to the second set of Stockhausen's sequence of piano pieces, although they took over seven years to reach final fruition - being completed just after Kontakte, and as such show signs of variable form-structure.

Within Klavierstück IX there is established a scale of transformation of duration-area[38] from the strictly periodic (a) to the

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37 a superimposition of groups or combination thereof

38 the area in which a given rhythmic event exists

extremes of aperiodicity (B).

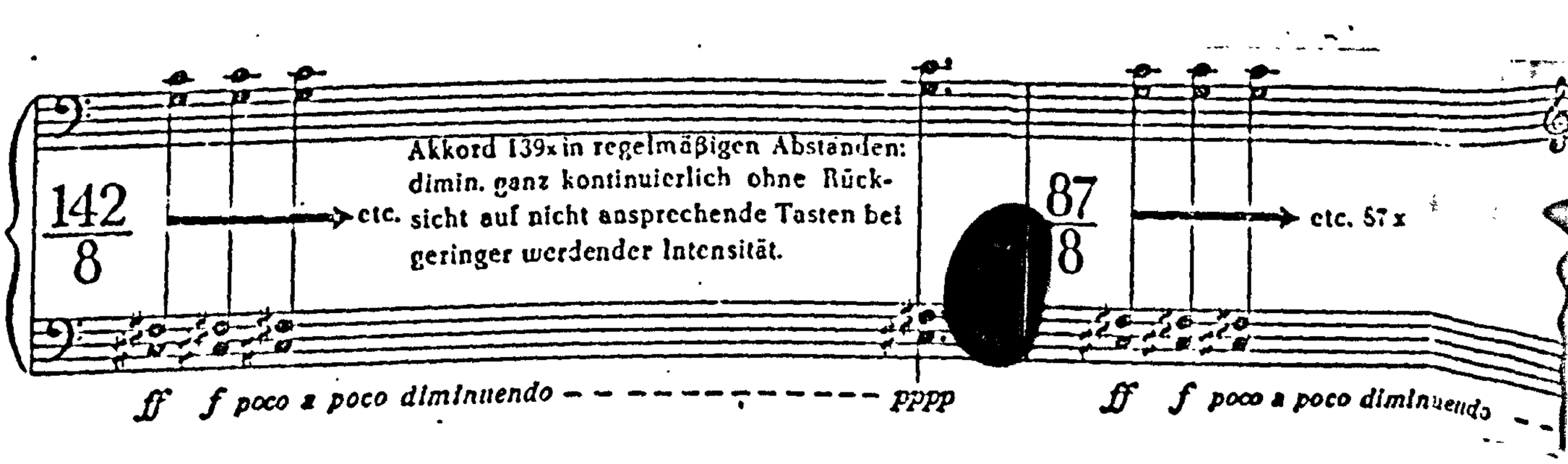
> "Starre, 'monotonous' Ereignisse verwandeln sich in flexible, 'polytone'"[39]

These duration-areas change sometimes very rapidly and are occasionally superimposed to produce original events.

The first of these limits (A) is typified in the extreme by the opening two bars (Example 2.11.1) which consist of two diminuendi containing 229 occurrences of the same chord (230 if the number of attacks is counted, as the first attack of bar three must then be included).

Example 2.11.1

(Klavierstück IX, bars 1 and 2)



This is followed by the second of the extremes (B), (Example 2.11.2) which, although basically just an ascending scale, contains a very high degree of aperiodicity.

Both A and B are contrasted by having different metronome markings (♩ = 60 and ♩ = 160). A is further characterized by its vertical sonority, whereas B usually features horizontal sequences of sound, sustained notes and grace-notes.

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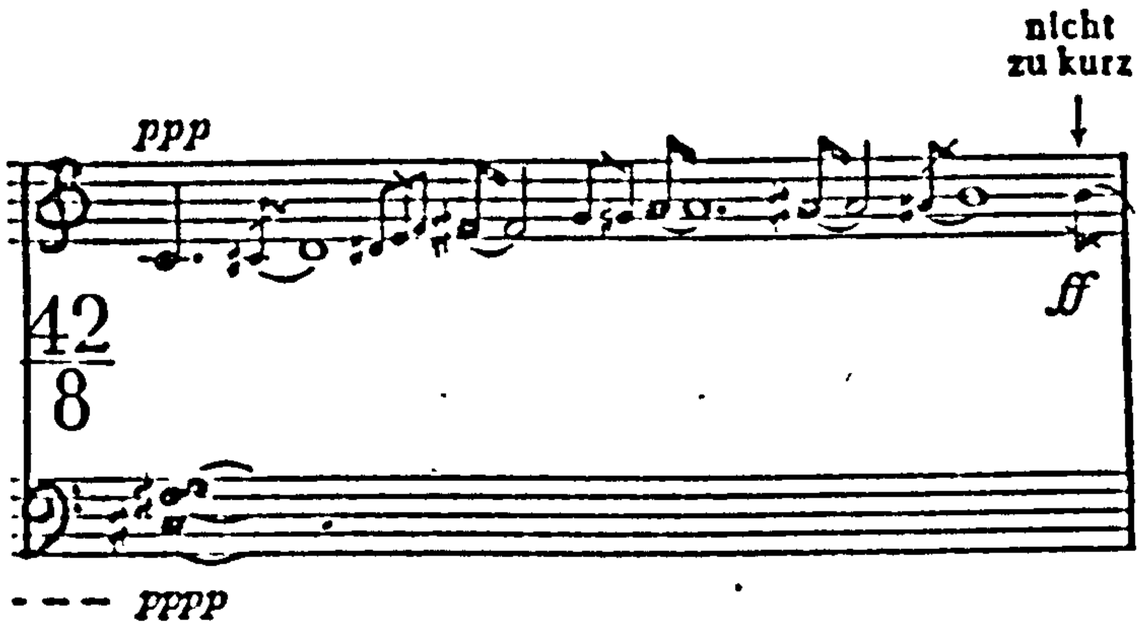
39 Texte, Band II, p. 106

"Fixed, 'monotonous' events are metamorphosed into flexible 'polytonous' ones"

Example 2.11.2

(Klavierstück IX, bar 3)



Bars 4 to 16 (all in the tempo ♩ = 160) are composed of repetitions of the opening chord with silences composed in between as in the diagram (Example 2.11.3). It is worth noting that the first occurrences of factors from idea B in A are the acciacciaturas $\overset{C}{F\sharp}$ to the triads $\overset{G}{C\sharp}$ in bar 4 and the sustained F occurring as a grace-note in bar 9.

Example 2.11.3

(Diagram of chords and silences in bars 4 - 16)

nr. of chords (in ♩)	13	21	1	8	5	2	3
nr. of ♩ silent	2	8	3	1	13	5	

Bars 17 to 34 are predominantly B, but with the vertical aspect of A superimposed.

Bar 35 contains a periodic repetition of a vertical sound obviously akin to A with a diminuendo and shortening of attack/decay: the sustained $A\sharp$ /C diad is held into the next section.

Continued analysis of this piece, at least as far as page 6, bar 2, would show this action and reaction between A and B. However, on page 6, bar 3, a "new" idea, C, is heard which represents the linear

fusion of A and B; it has the metronome marking ♩ = 120: the three metronome markings are in the relationships:-

A : B : C :: 3 : 6 : 8

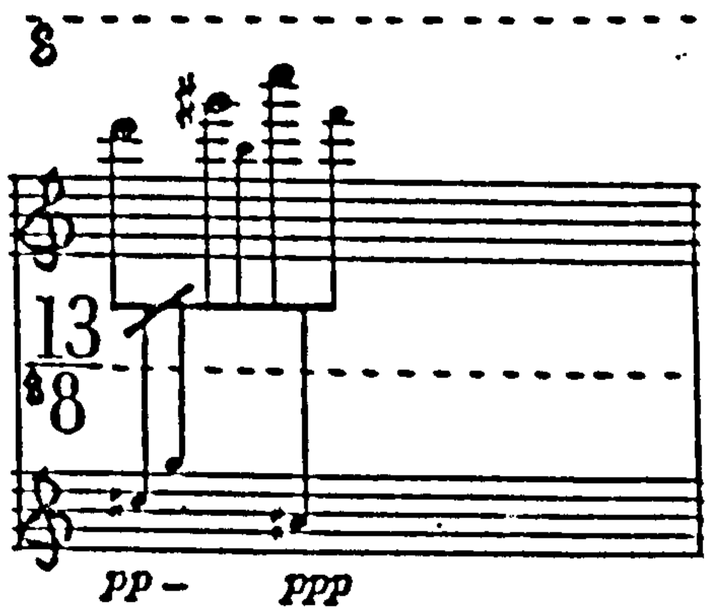
:: 1 : 2

3 : 4

The occurrence of silence and aperiodicity/periodicity are here both relatively free. The composer indicates, in a note, that the grace-notes are to be played as fast as possible; this means that, since some intervals are easier to play than others, irregularity in duration between attacks is bound to be evident: similarly the end of each group (Example 2.11.4), will only be determined by the technical skill of the player (to a lesser extent this will also be determined by the physical characteristics of the instrument used).

Example 2.11.4

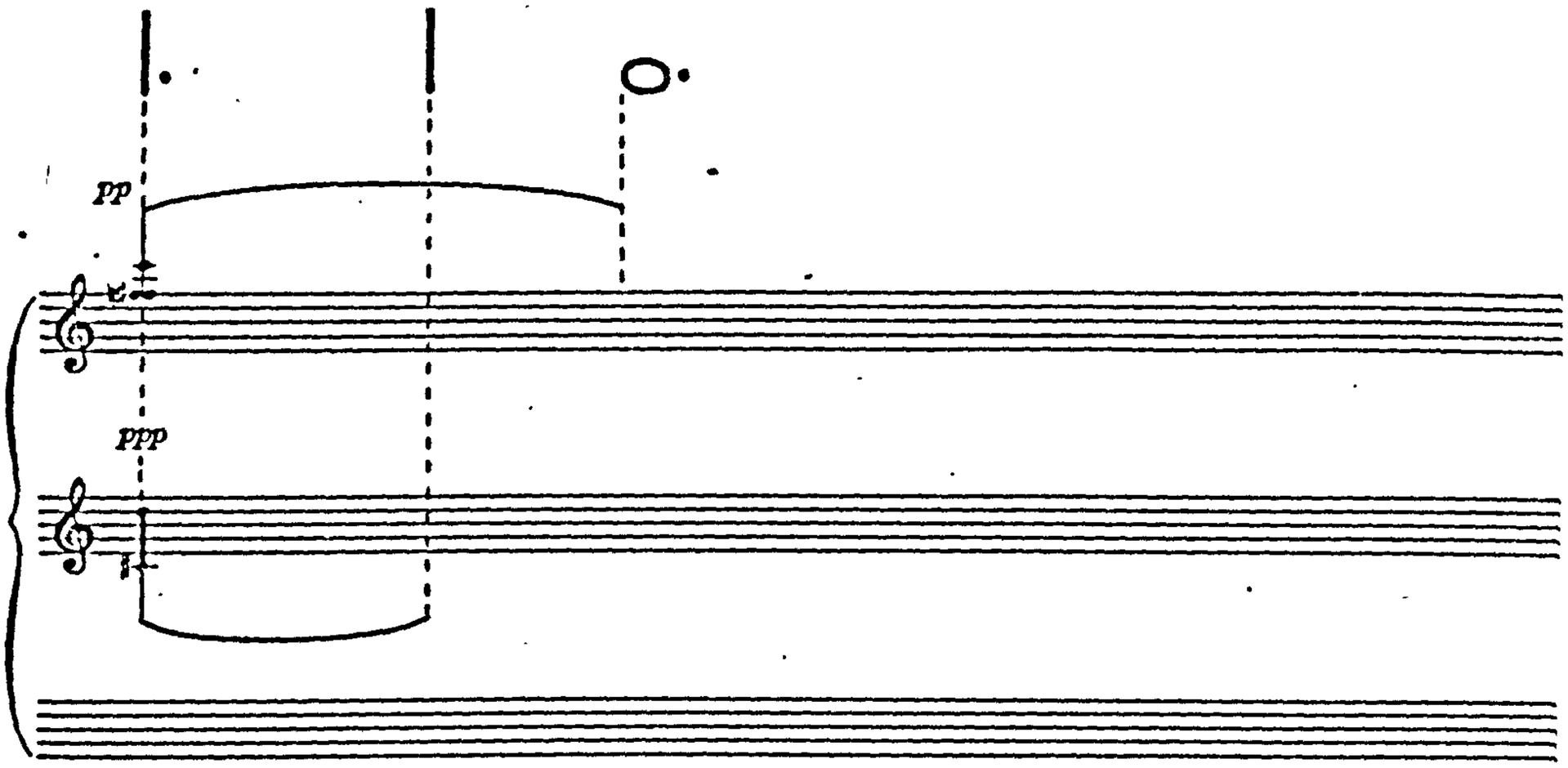
(Klavierstück IX, page 7, bar 16)



Klavierstück X contains a scale of transformation established between organization and freedom which includes elements with differing degrees of order. The higher the organization the more important the individual event becomes (Example 2.11.5), possessing few, if any, varying parameters. The greater the freedom the less important the individual event and the more altered the various parameters become, (Example 2.11.6).

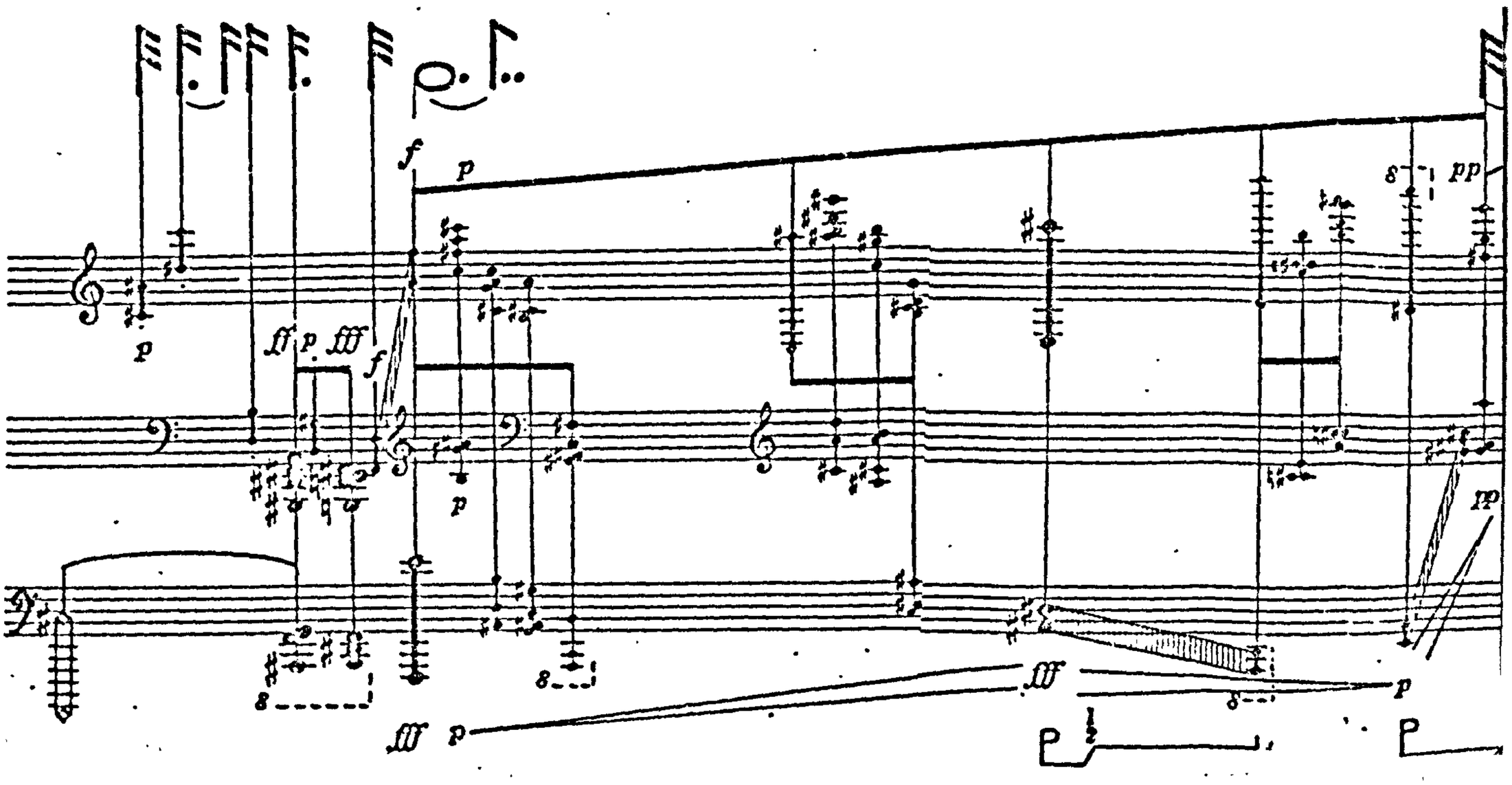
Example 2.11.5

(Klavierstück X, from p. 33)



Example 2.11.6

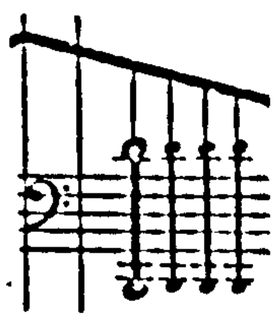
(Klavierstück X, from p. 22)



As in Punkte, revised one year later in 1962, Stockhausen has almost obscured the original notes with the profusion of grace-notes, clusters and glissandi; no longer just for the sake of embellishment and reaffirmation, but more to create new strata parallel with the original material: compare the simplicity of Example 2.11.7 with the complexity of Example 2.11.8, both of which are obviously the same event, the only important change being that the cluster is now repeated at different levels.

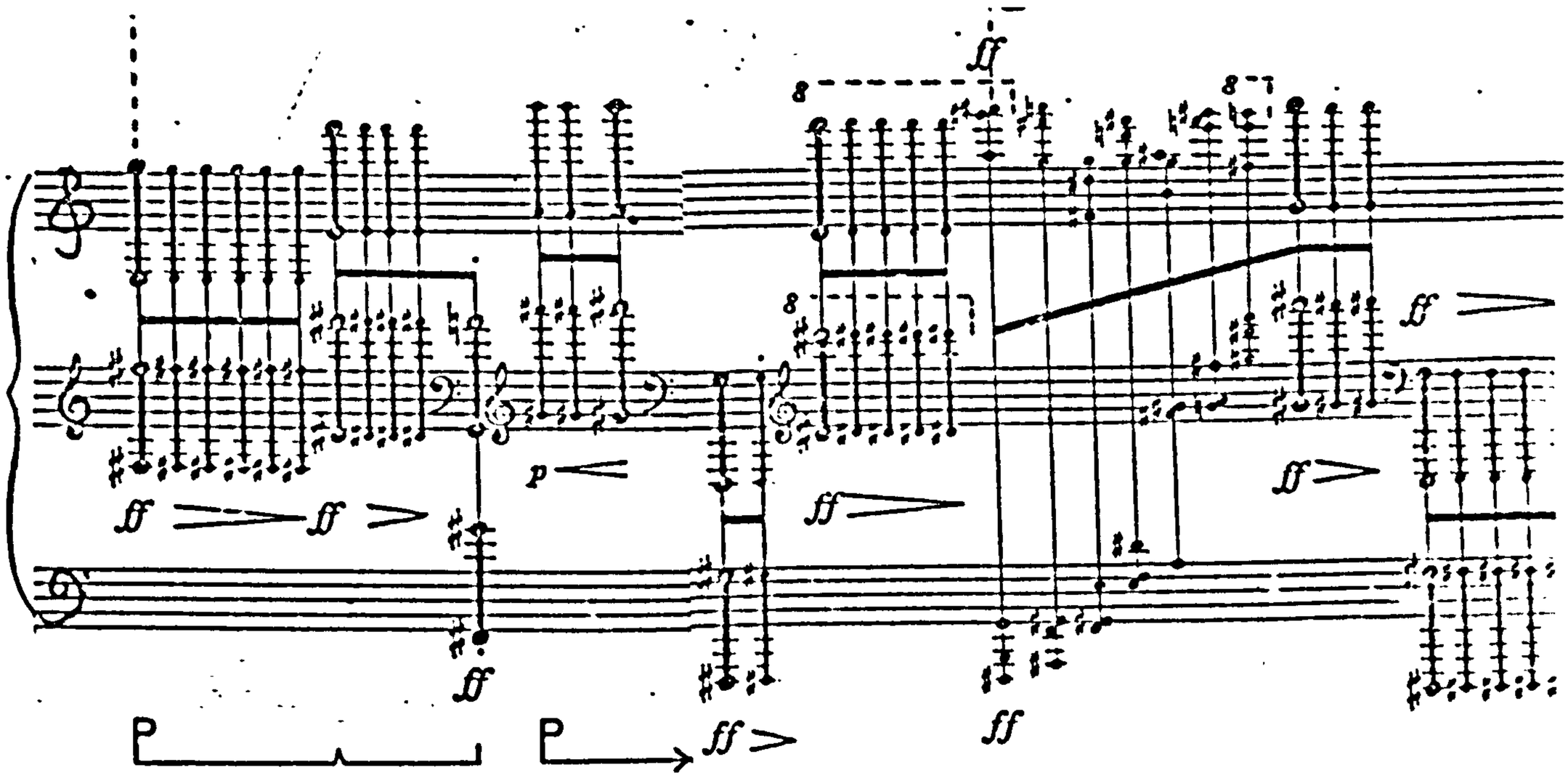
Example 2.11.7

(Klavierstück X, from p. 2)



Example 2.11.8

(Klavierstück X, from pps. 19 and 20)



This makes the event easier to appreciate as it takes longer to aurally occur and, by that repetition at different levels, has attention drawn

to itself. In fact, as Roger Smalley points out:-[40]

> "The form of Piece 10 ..... begins at the point of greatest complexity and gradually becomes simpler as it progresses. The first five-and-a-half pages present ..... all the ideas of the entire piece. Thereafter the ideas become separated and developed."

2.12 Zeitmasze nr. 5

(Time-measures)

Year of composition	:	1955 - 1956
Forces required	:	oboe, flute, english horn, clarinet, bassoon
First performance	:	"Domaine musical", Paris, 15th December, 1956
Duration	:	c. 14 m.

Zeitmasze was the first work that Stockhausen had written for some time that was really concerned with precise happenings in the micro-form. In it is found a continuation of the evolution of group-form structure, started in Klavierstücke I - IV and reaching its characteristic appearance in Gruppen: Klavierstücke IX - X are excluded because, since they were revised in 1961, they are written within the field of variable-form-structure. It is possible to discern in Zeitmasze elements within the range of transformation from the wholly statistical to the isolated pointillist note: whole block-like structures (Example 2.12.1) occur side by side with groups in which each individual note is of ultimate

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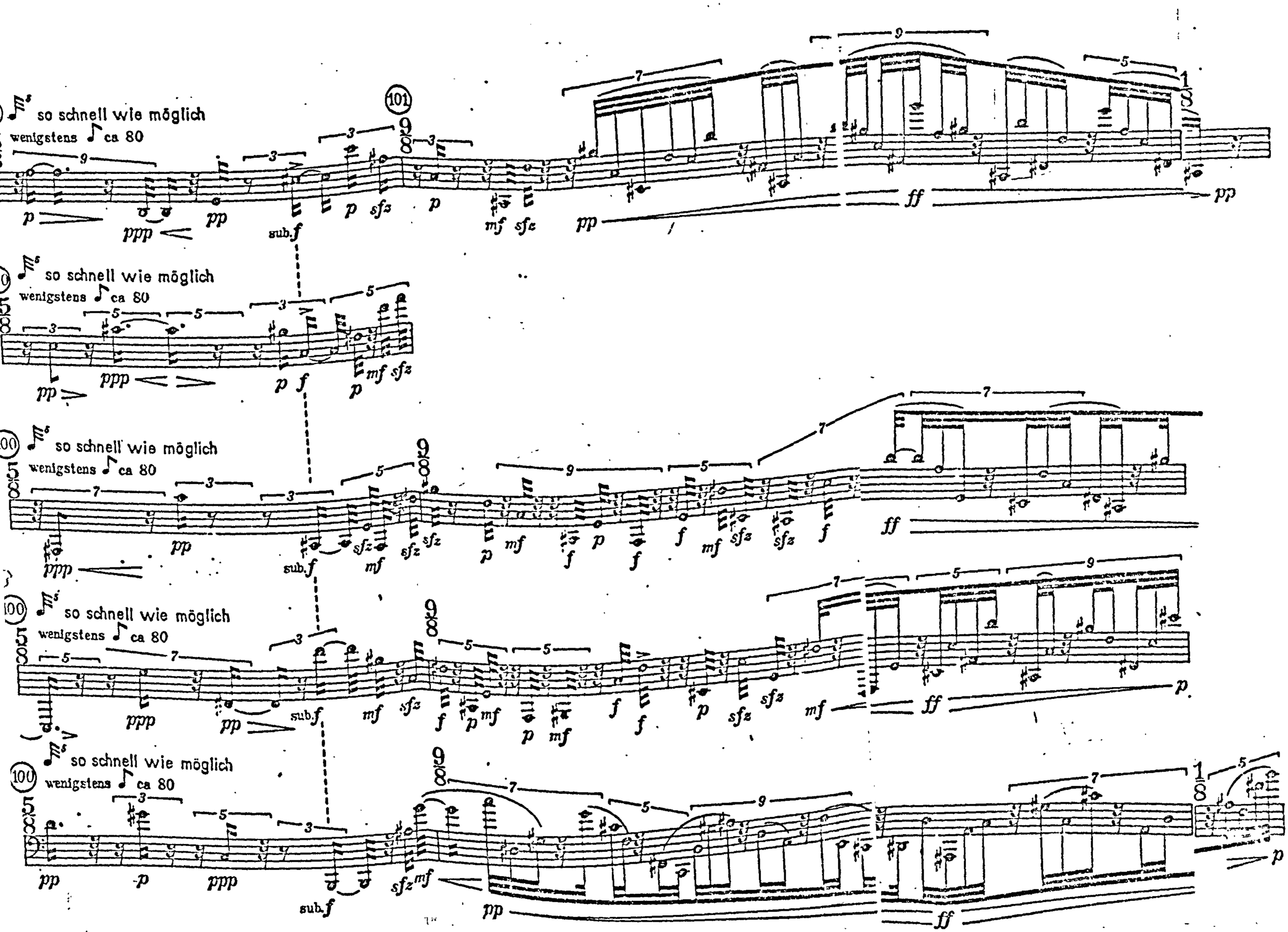
40 Stockhausen's Piano Pieces, Roger Smalley
"The Musical Times", 1969, pps. 30 to 32

Example 2.12.1

(Zeitmasze, p. 26, groups 100 and 101)



significance (Example 2.12.2). This is not to say that group-form is all that is used in Zeitmasze: variable-form-structure in its embryonic

Example 2.12.2

(Zeitmasze, p. 25, groups 96 to 99)

shape may be recognized, as in the passages marked to be played "so langsam wie mögliche ..... mit einem Atem!"[41] Here the tempo is imposed by the register of the instrument, the player's breath-control, the dynamic intensity indicated and the number of notes involved in that same group.

The most important aspect of Zeitmasze is the use made of the two areas of the time-field known as duration and rate of change of periodic duration. Within the composition five different "Zeitmassung"[42] are used:-

1. A scale of transformation of tempo is established roughly corresponding to a chromatic scale (i.e. each element is different from its immediate neighbour by a factor of $\sqrt[12]{2}$). In theory this produces scale 1 (Example 2.12.3), but in practice Stockhausen has rounded it off to the markings in scale 2 (Example 2.12.3).

---

41 "as slow as possible ..... in one breath!"

42 time-measures.

Example 2.12.3

(Scales of tempi in Zeitmasze)

Scale 1 (theory) :	42	44.5	47.1	49.9	52.9	56.1	59.4
Scale 2 (practice) :	42					56	60

Scale 1 :	62.9	66.7	70.6	74.9	79.3	84	88.9	94.8
Scale 2 :	63	66		74	80	84	90	96

Scale 1 :	99.9	105.2	112.1
Scale 2 :		102	112

The serial involvement of these tempi is only to be found in the outer sections of the work (they are never applied as strictly as they were to be in the later Gruppen), However each tempo does appear in the course of the work, although some appear far less frequently than others. At times (group 184) there are occasions of concurrent different tempi.

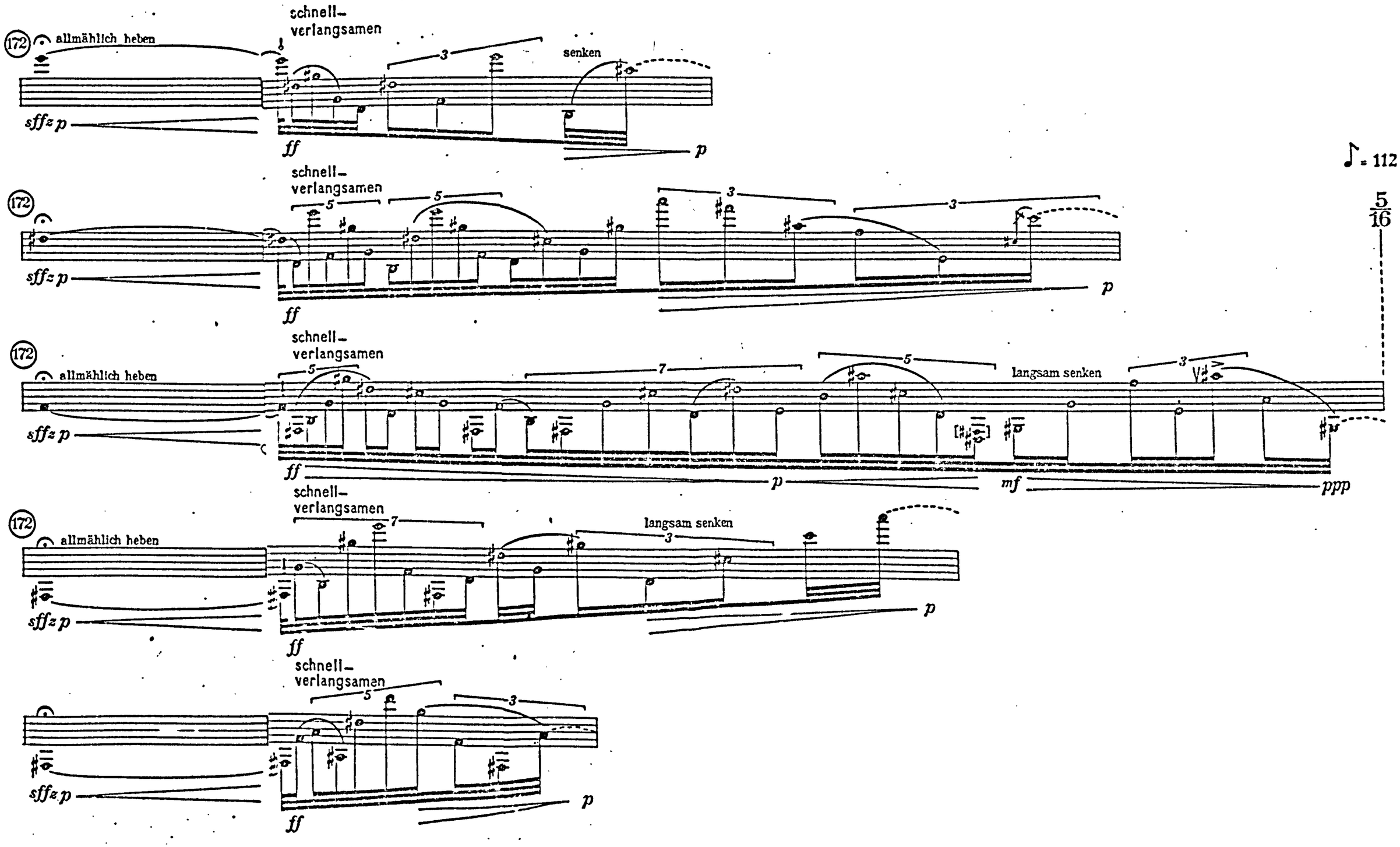
2. As fast as possible. This relates to the speed at which it is possible to play the shortest notes in a specified passage. Hence the objective rate of change of duration may seem fast or slow, depending on context.

3. As slow as possible. In other words the overall duration is determined from the concurrent material, and then the internal proporitons may be worked out. One instrument is usually assigned 'leader' is this procedure.

4. Fast - ritardando. Begin very fast and slow down regularly such that the final tempo is in a 4:c1 relationship with the original. The speed is set, since at the beginning the smallest note-duration is to be played as fast as practicable. In group 172 (Example 2.12.4), all five instruments have a pause followed by a passage beginning with notes which might be playable at ♩= (approximately) 112. The written effect is one of a diminuendo and ritardando and, since it is marked "schnell - verlangsamen" (i.e. fast - ritardando), the tempo at the close of the english horn's

Example 2.12.4

(Zeitmasze, group 172)

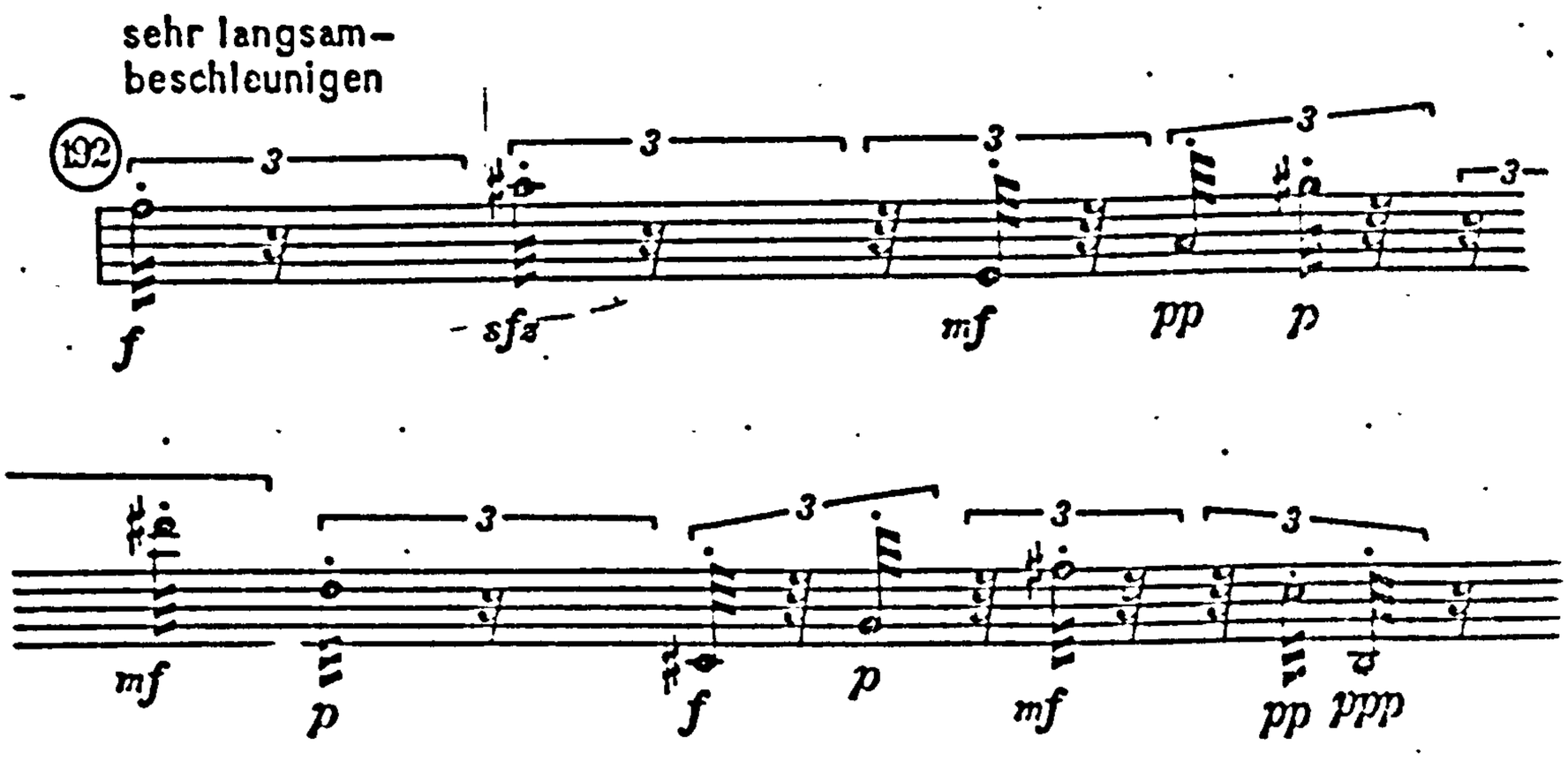


low G♯ would be ♩~ 56; the other instruments falling out as the ritardando progresses.

5. Slow - accelerando. The first prerequisite is to establish the final tempo of the group (as fast as practicable), and then to give the opening section a marking in the relationship c4:1. In group 192 (Example 2.12.5) the oboe has notes at the end which could be played at ♩~ 112, this would indicate an opening tempo for this group of ♩~56.

Example 2.12.5

(Zeitmasze, group 192)



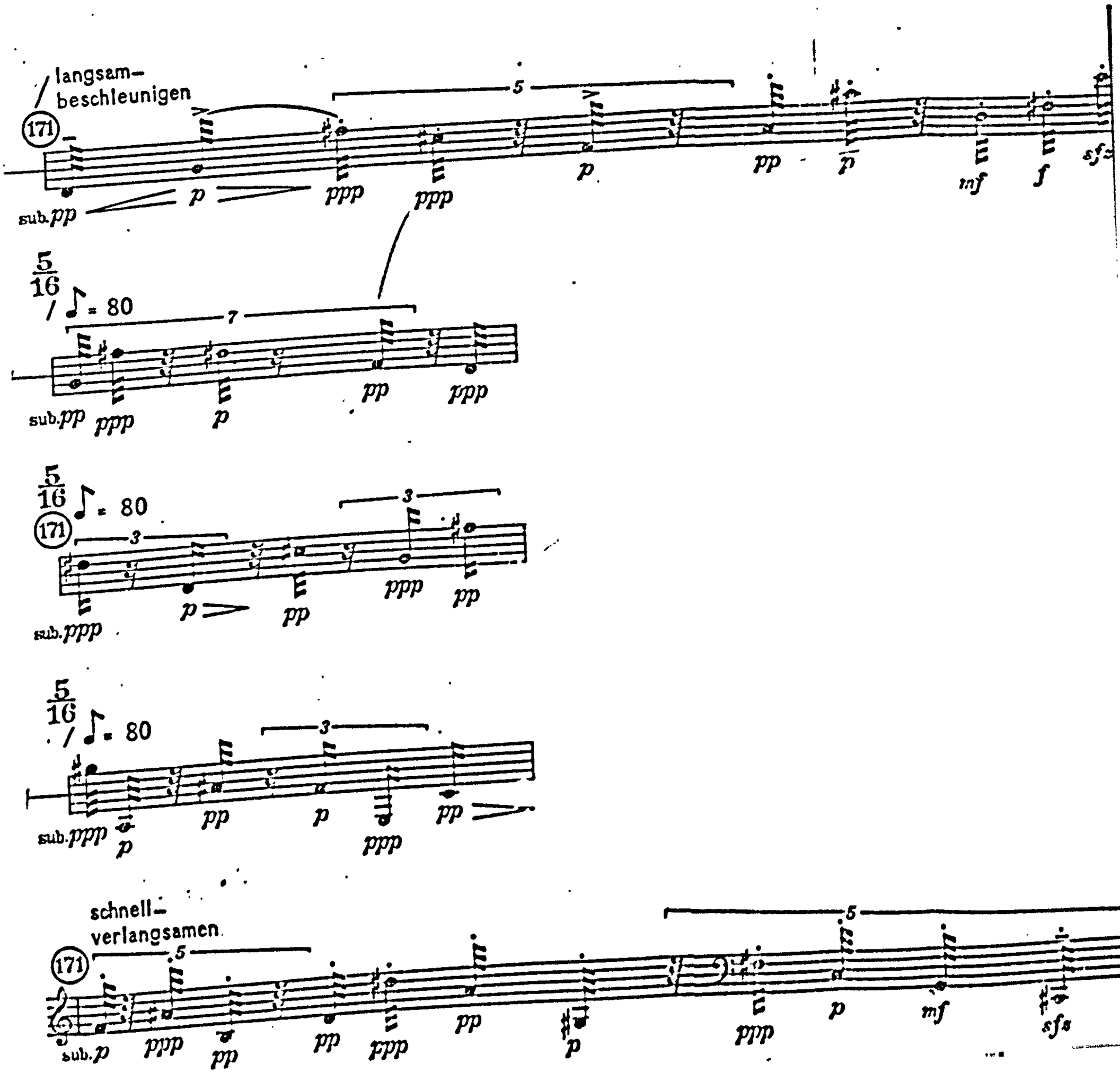
Quite frequently these indications occur simultaneously, as in group 171 (Example 2.12.6) which contains temporal elements 1, 4

Zeitmasze may be divided into sections by means of the time measures in operation; in this way fifteen such sections may be de belonging to either the category of vertically constant time-measure or that of irregular vertical time-measures. (Example 2.12.7)

Within certain of the irregular sections a few points of compositional interest arise. In Section B the constant tempo of ♩ is maintained in one part throughout, whilst one, and then two, oth

Example 2.12.6

(Zeitmasze, group 171)



Example 2.12.7

(Zeitmasze, divisions into sections be means of category of time-measure)

Vertically constant time-measures		Vertically varying time-measures	
Section	Groups	Section	Groups
A	1-28	B	21-43
C	44-66	D	67-82
E	83-106	F	106-133
G	133-152	H	153-173
I	174-190	J	188-207
K	208-229	L	230-270
M	271-294	N	295-335
O	337-352		

strata is composed of occurrences of elements (2)-(4): a similar state of affairs exists in H. In I the flute and then bassoon have short solo sections, as does the clarinet in section J.

Within section J the first few groups (201-206) consist of rather complex vertical tempo relationships (Example 2.12.8), which sort themselves out in group 206.

Stockhausen's system of time-measurement is clearly rewarding in Zeitmasze, for there is a maximum of only five possible strands in any vertical texture. The beauty of the sheer logicality of the evolution or disintegration of the various lines has been so ably demonstrated by both Marcus in 'The Music Review'(May 1968, p. 146ff) and Harvey (The Music of Stockhausen - an introduction, p.51) that further elaboration will not be presented here.

It has not proved possible to trace a pitch relationship throughout this composition other than the rudimentary set found by Marcus: nor has it been proven that numerical relationships between the durations of the various groups, sections or pitches exist.

Example 2.12.8

(Zeitmasze, vertical tempo relationships in groups 201 - 206)

Instrument	Group						
	201	202	203	204		205	206
Oboe	112	64					112
Flute			112	64	112		
English horn	80						112
Clarinet		112	96		112		
Bassoon	112						112

The proportions between 64:80:90:112 are the same as 4:5:9:11·2.

2.13 Gruppen für drei Orchester nr. 6

(Groups for three orchestras)

Year of composition : 1955 - 1957

Dedicated to : Herbert Eimert

Forces required : Three orchestras (the disposition of the orchestras is given in the introduction to the score, along with the instructions regarding pitches of the cowbells, wood-drums, etc.

First performance : "Rheinsaal des Messegeländes", Cologne, 24th March, 1958

Commissioned by : W.D.R. (Cologne)

Duration : c. 25 m.

Although not completed until after Klavierstück XI and Gesang der Jünglinge, Gruppen should be considered here for its own contribution to the culmination of the principle of group-structure, as well as to that of statistical-form-structure. A detailed analysis will not be given as this would entail so much space and time as to give the impression that Gruppen is of paramount importance within Stockhausen's output. That is not to say that it is not a significant work - as the discussion following will demonstrate.

Before analysis there is one question worthy of answer: why three orchestras? In Zeitmasze it was possible to have different tempi and aperiodic changes in tempi without any real difficulty. When this problem is transferred to the orchestra, however, one conductor would be unable to cope with all the problems of co-ordination, and the players would not be technically capable of performing the different tempi, etc.: hence three orchestras, each with its own conductor. Having decided on this distribution for technical reasons, Stockhausen then decided to incorporate the parameter of space/orientation into the compositional process used in creating Gruppen.

> "Der gesamte Prozess dieser Musik wurde von räumlichen Dispositionen des Klanges, der Klangrichtung, Klangbewegung."[43]

Gruppen may be divided into seven large sections as follows:-

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43 "The whole process of this music was co-determined by the spatial disposition of sound, by sound direction, sound motion."

(Gruppen" für drei Orchester - Stockhausen, record sleeve DGG 137002; translated by Rolf Gehlhaar)

Section	Groups
A	0 - 15
A*	16 - 22
B	23 - 70
B*	71 - 77
C	78 - 113
C*	114 - 122
D	123 - 174

Within sections A, B and C are found the most developmental features, the orchestras being nearly always in different tempi and using idiosyncratic blocks of generally dense sound, often passed from orchestra to orchestra. Their complementary sections are A*, B* and C* and are completely different. Their main characteristics are solo instruments (or groups of instruments), constant vertical tempi, the maintainance of material on one orchestra with the others providing a background or commentary, transparent textures and a much lower rate of change of event. Following the climax of the whole work (C*), D is heard, acting as a coda - the contrasting sounds and timbres gradually disappearing until the final staccato horn G.

Before discussing each section in greater detail it is necessary to consider the organization of the various parameters in Gruppen.

Hitherto the application of group-form consisted of organizing "points". In Gruppen this is transferred to the organization of the groups themselves into collective groups, the importance of the individual note or interval becomes less and less - only being appreciated for themselves in sparsely orchestrated sections. However, Stockhausen has organized Gruppen on the microscale and this will now be revealed.

The general principles behind the composition of Gruppen were formulated in his article "... wie die Zeit vergeht ..." and may be

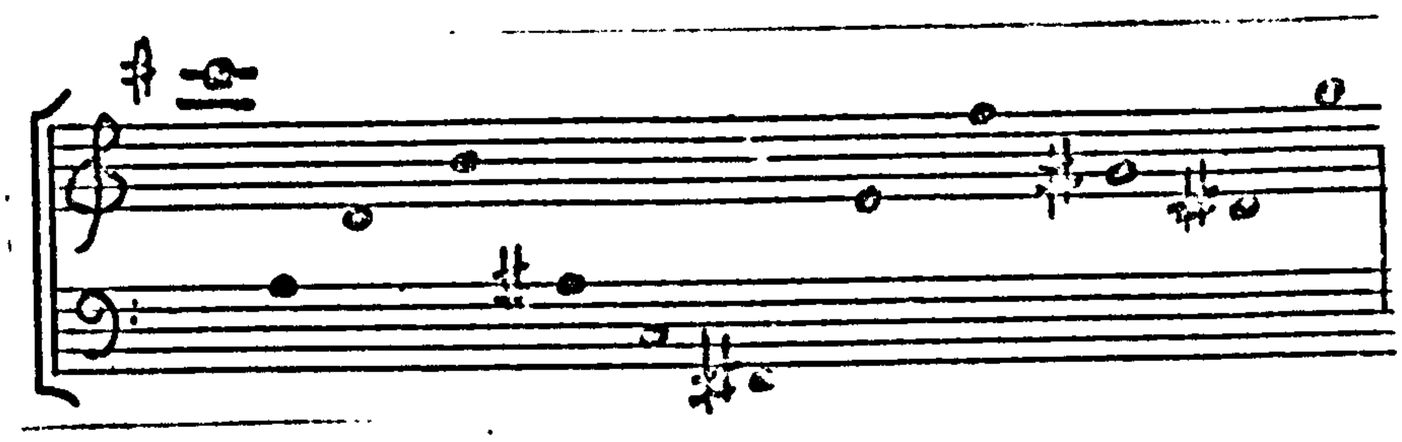
found therein.[44]

In Gruppen Stockhausen organizes several parameters within a universal set:-

(1) The pitches, selected from the twelve semi-tones of the chromatic scale, are written in a set as follows (Example 2.13.1). In this set the second hexachord is the retrograde of the first transposed a tritone: i.e. reading forwards or backwards the interval sequence is the same. Ignoring octave transpositions, this set contains all eleven intervals once each: i.e. each hexachord contains six consequent pitches of the chromatic scale (the antecedent for the cluster groups to be found within the work).

Example 2.13.1

(Gruppen, pitch-set)



(2) A tempered chromatic scale of tempi is established within the range (♩= 60 to 120), by multiplying each successive element by $2^{1/12}$. If 60 is assigned to the pitch A and so on up the scale, the following equivalence results (Example 2.13.2a), which, if rationalized and ordered as a set in the same sequence as the pitch-set, will produce the tempi-set used in the work (Example 2.13.2b).

(3) Each of these durations is now assigned the value of a whole note within the middle register of the aurally perceptible pitch-field (Example 2.13.3). If then it be accepted that these durations

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44 die Reihe, volume III, p. 10 seq.
Texte, Band I, pps. 99 to 138

Example 2.13.2 (a and b)

(Gruppen, tempi scales)

2.13.2a (theoretical)		2.13.2b (practical)	
pitch	tempo	pitch	tempo
A	60	C#	75.5
A#	63.6	A	60
B	67.4	D	80
C	71.4	B	67
C#	75.6	A#	63.6
D	80.1	C	71
D#	84.9	F#	101
E	89.9	E	90
F	95.2	F	95
F#	100.9	G#	113
G	106.8	D#	85
G#	113.3	G	107

(It is worth noting that each segment of the set is a hexachord consisting of either the first or last six elements of the scale).

Example 2.13.3

may be transposed in a similar manner to the pitches they represent by altering their time-values (one octave higher ≡ half the length; two octaves lower ≡ twice the length), then the following duration-set is produced (Example 2.13.4).

Example 2.13.4

(Gruppen, duration-set)

(4) To obtain the relative proportions of the groups it is necessary to calculate the intervallic proportions in the pitch-set. Since each element with the exception of the first and last has two ratios associated with it, then interlocking of groups will occur. The proportions established, as given by Stockhausen,[45] are given in the following table (Example 2.13.5).

Example 2.13.5

(Gruppen, intervallic proportions in the pitch-set)

2	:	10		12	:	7		5	:	9		7	:	2		3	:	5		10	:	4
		4	:	3		6	:	13		8	:	11		13	:	6		9	:	12		

Although, by calculation, the proportions 2/10, 9/12 and 10/4 work out at 1/5, 3/4 and 5/2 it makes no practical difference which is used. The application of this scale of proportions to the construction of interlocking sets is demonstrated by the composer in his article mentioned above.

There now follows a short account of the various sections outlined in the table on page 109.

Section A (groups 0 - 15)

Group 0 refers to the first bar and is inserted before the first group in order that the complex textures of group 1 may be better appreciated: its compass is identical to that of the first group. Following group 0, Section A proper begins. This section is divided into two super-groups, as was the first section of Klavierstück I.[46] However, in the case of Gruppen section A has

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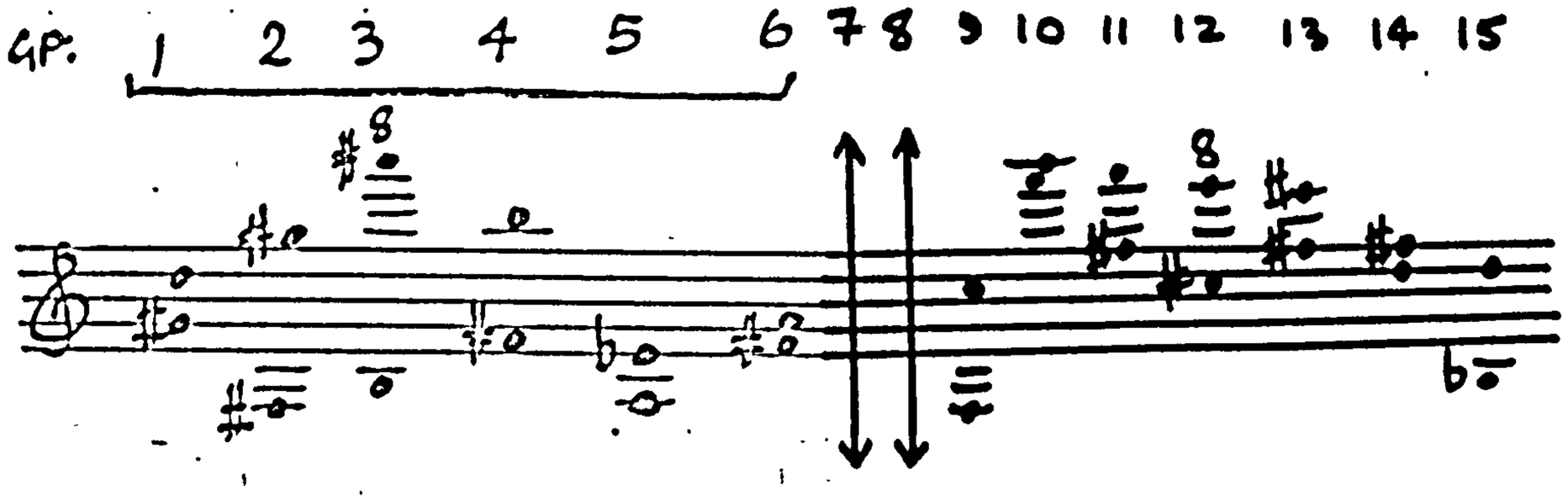
45 Texte, Band III, p. 117

46 see p. 75

a further insertion in the middle to give it a quasi-tri-partite structure. The first sub-section (1 - 6) is characterized by an expansion and contraction of the pitch-area used for the individual groups (Example 2.13.6). The middle sub-section (7 and 8), features the whole range of the pitch-area, with the three orchestras playing in the same tempi (Example 2.13.6). The third sub-section

Example 2.13.6

(Gruppen, pitch-areas of groups 1 - 15)



(9 - 15) is characterized by a contraction - expansion - contraction - expansion of the time-area, in the two lower orchestras only for groups 9 - 14.

Although this division is by means of pitch-area, subdivision of section A may also be achieved by use of timbre. The predominant sounds in sub-section one, (6 - 12), are those of woodwind and bowed strings. From group 7 (the first coincidence of all three orchestras) there is a gradual accelerando and crescendo which reaches its climax in the 6th, 7th and 8th bars of group 7: this then decays through group 8 and group 9 (1).[47] Groups 10 to 13 are characterized by a sustained band of sound in Orchestra I,

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[47] i.e. group 9, bar 1

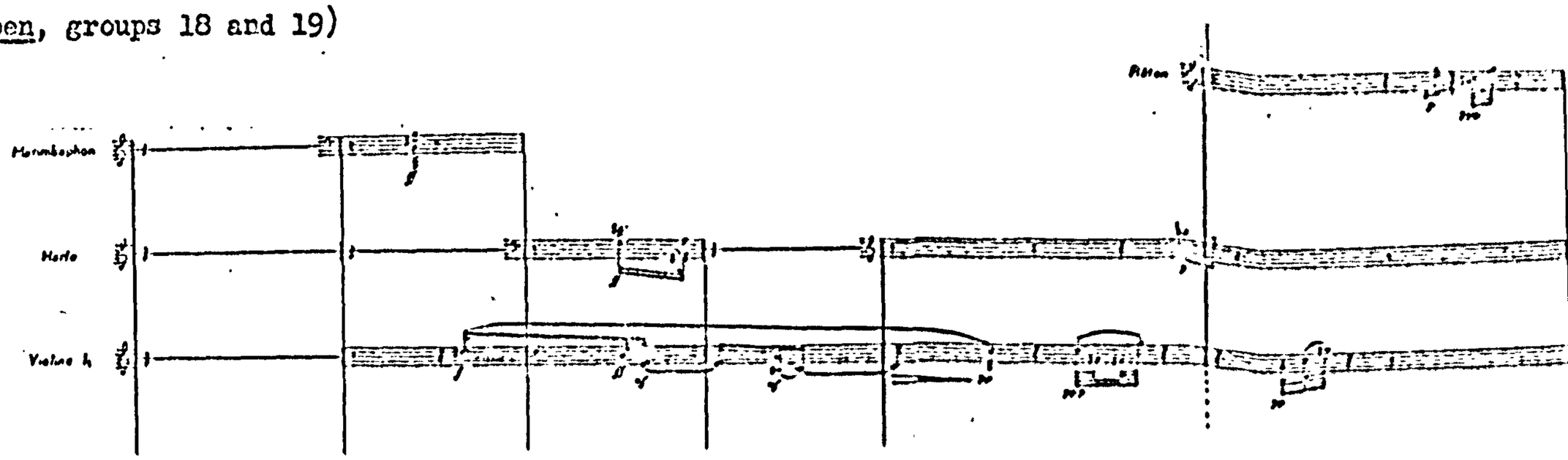
against which the other two orchestras play high-pitched decorations and interpolations. Groups 14 and 15 serve as a conclusion to section A, being played by the second and first orchestras respectively with material reminiscent of groups 1 to 6.

Section A* (groups 16 - 22)

Within this section the solo violin is very prominent, having been featured a little in section A: this may be seen in groups 18 and 19 in which its solo consists of ten out of the twelve pitches in the pitch-set, (Example 2.13.7). Formally this section consists of an accelerating passage which becomes more active as it progresses (16 and 17). A calmer middle section then follows (18 and 19),

Example 2.13.7

(Gruppen, groups 18 and 19)



after which the first idea returns rather abruptly accelerating to the same tempo (♩ = 120), as group 17 (7), (20 and 21). The closing group consists of a decay. Hence the structure of section A* is virtually a mirror of section A.

Section B (groups 23 - 70)

This section may be divided into four sub-sections: 23 - 35, 36 - 45, 46 - 61, 62 - 70. Group 23 serves as a transition from section A*. Each of the four sub-sections is announced by a two-note motive played on the E♭ clarinet (Example 2.13.8). Group 38 represents a temporary relaxation of the tension in the music,

Example 2.13.8

(Gruppen, E^b clarinet motives beginning the four sub-sections of section B)

Group 24

Group 36

Group 46

Group 62

having the sonorities of pizzicato violincello, harp, celeste, drum and marimba. In group 44 the electric guitar is prominent. In the same way that section A* featured the solo violin touched on in section A, section B* will give prominence to the three groups:-

E^b clarinet

pizzicato violincello, harp, celeste, drum, marimba

electric guitar

Section B* (groups 71 - 77)

Although containing only seven groups this section is relatively extensive. It may be divided into four sub-sections. The first (71 - 73), is a cadenza-like passage for the second group mentioned in section B which, after three bars of ritardando consists of an accelerando (71), sustained tempo (72), and ritardando (73). The second sub-section (74 and 75) is a cadenza for the electric guitar. The third (76), features the Eb clarinet, with flute, oboe and clarinet interjections. The closing sub-section (played on all three orchestras), is a passage for the sonorities of the first sub-section; this time however played fff and with complementary instruments added. The E^b clarinet has two important isolated interjections during the course of this sub-section.

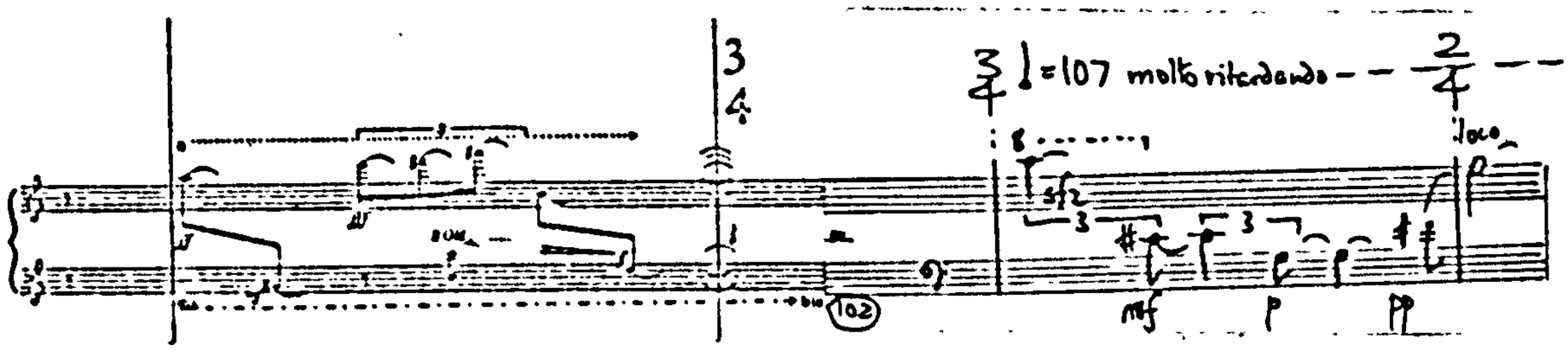
Section C (groups 78 - 113)

Throughout this section the brass family becomes more and more important. In it the three orchestras are rarely in the same vertical tempo.

In this section the piano is featured, generally in its high register, as in groups 92 to 107, with a hint of things to come in its short solo passage in group 101 (Example 2.13.9).

Example 2.13.9

(Gruppen, group 101)



Section C* (groups 114 - 122)

This section contains the two chief climaxes in the whole work. The first of these (groups 115 - 119), is achieved by the brass and the piano; really it is an accompanied brass cadenza featuring all the instruments of that family. Group 120 represents a piano cadenza, with two hints of brass, which relaxes the tension sufficiently for the second climax - a drum cadenza (121), followed by a build-up through skin, wood and metal percussion and muted brass to the overall climax (mutes off) at 122 (18 ii).

Section D (groups 123 - 174)

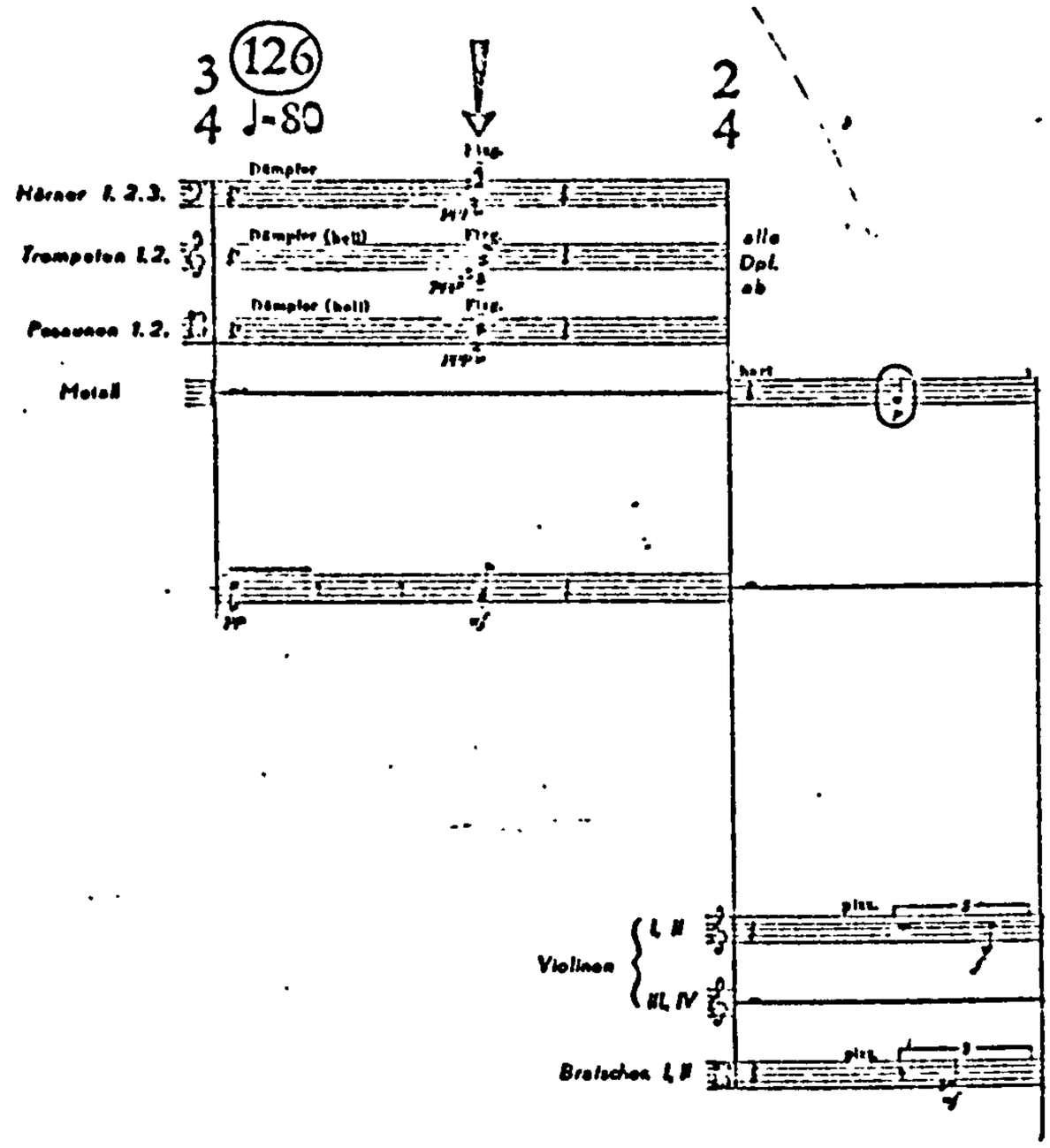
This section follows group 122 without a break and represents the coda to the entire work - making its undulating progress towards the final bars. Just as Gruppen itself may be divided into seven sections, so also may this coda:-

Sub-section D1 (groups 123 - 140)

The prominent feature in these groups are the brass chords, flutter-tongued, and the single strokes played on the metal percussion, usually cymbals, (Example 2.13.10).

Example 2.13.10

(Gruppen, group 126)

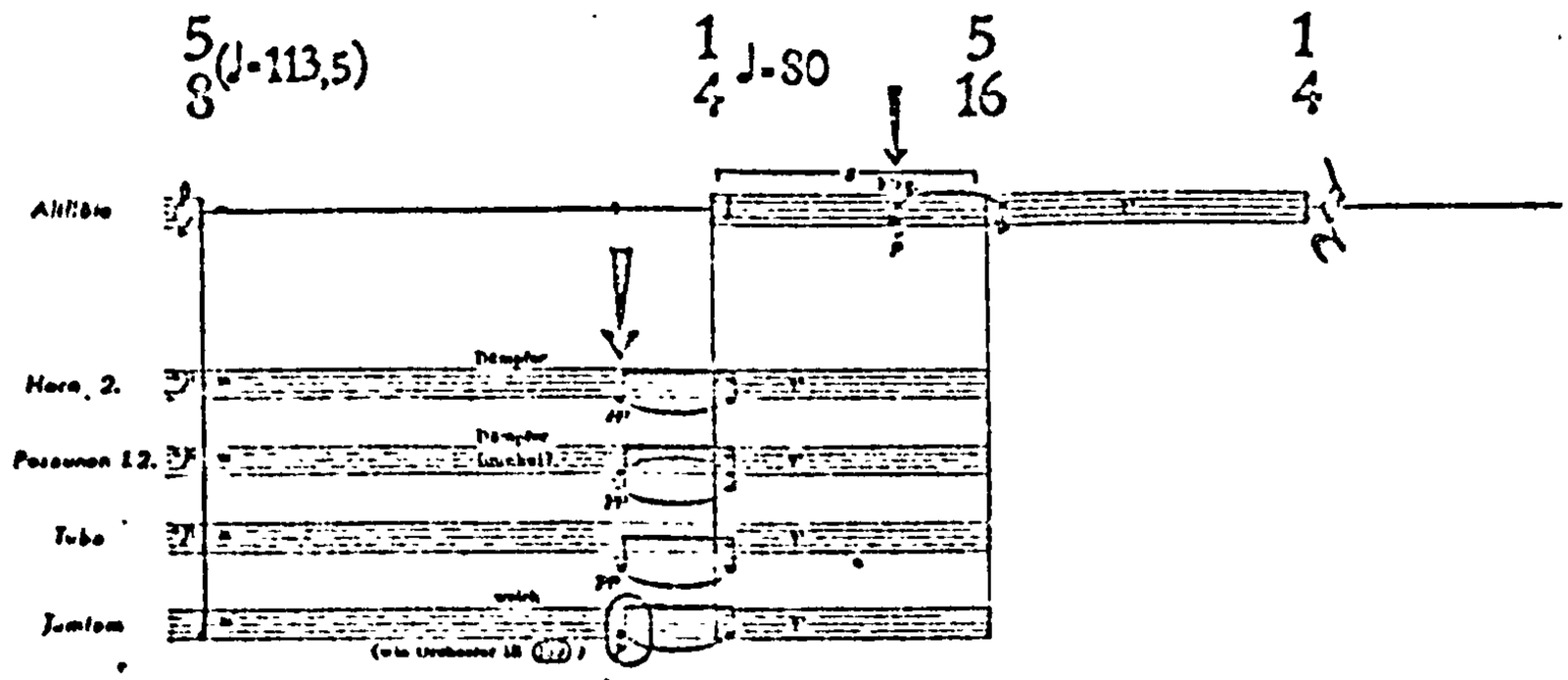


Sub-section D2 (groups 141 - 144)

Here the chief musical identity is that of the brass chord played simultaneously with a tam-tam/cymbal stroke, followed by a flutter-tongued note on the flute, (Example 2.13.11)

Example 2.13.11

(Gruppen, group 141)

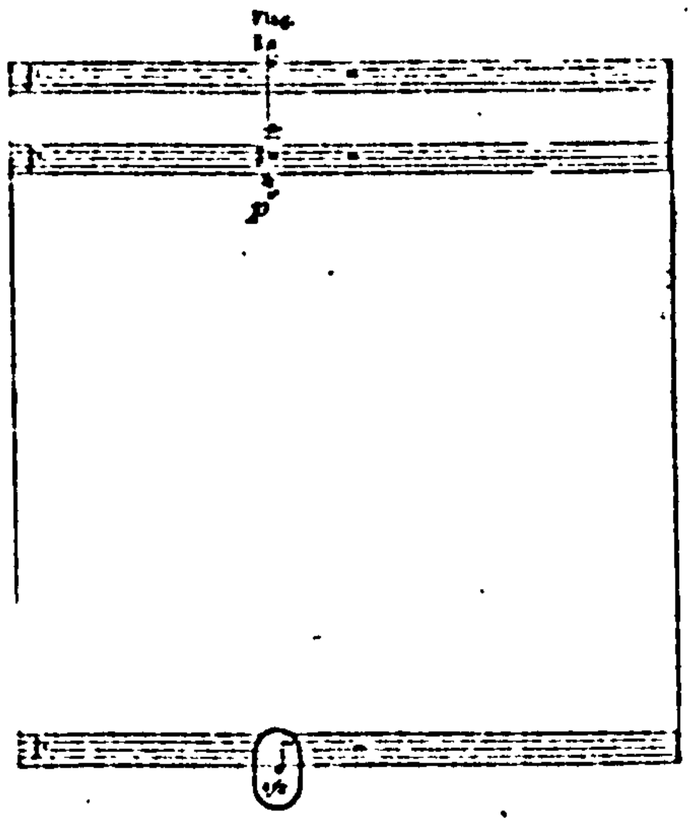


Sub-section D3 (groups 145 - 151)

Against a predominantly quiet woodwind and percussion sonority from orchestras I and III, the feature of D3 is a single vibraphone stroke coincident with a tetrad played by flute, alto flute, Eb clarinet and clarinet (Example 2.13.12). Group 151 represents the transition tc D4.

Example 2.13.12

(Gruppen, group 149)



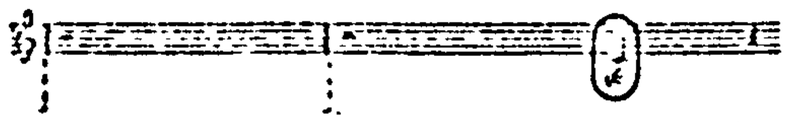
Sub-section D4 (groups 152 - 154)

This sub-section is characterized by single sfz strokes on the

vibraphone (Example 2.13.13)

Example 2.13.13

(Gruppen, group 153)

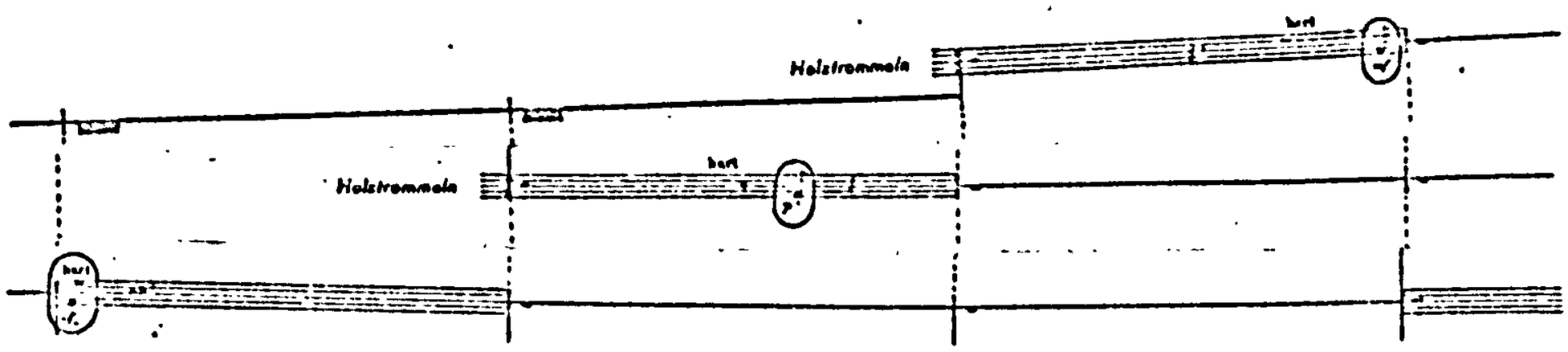


Sub-section D5 (groups 154 and 155)

The overlapping of sub-sections here is most apparent, since both groups 154 and 155 contain elements of D4 and D5. The predominant sound of this sub-section is the single stroke on the drum which is passed from orchestra to orchestra (Example 2.1314).

Example 2.13.14

(Gruppen, group 155)

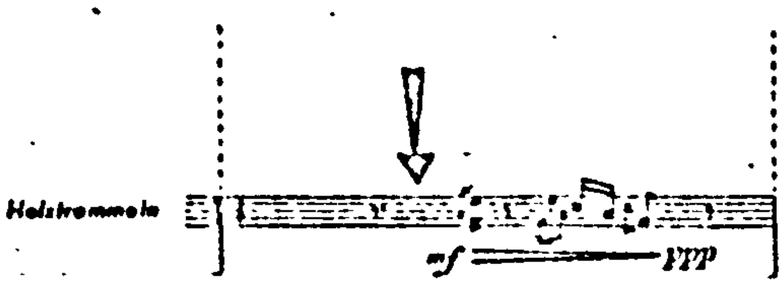


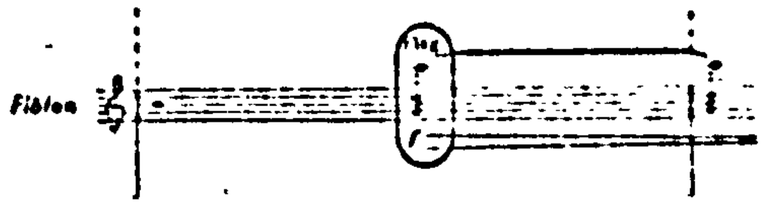
Sub-section D6 (groups 156 - 171)

During this sub-section the characteristic sounds of flutter-tongued flute and drums continue, (Example 2.13.15).

Example 2.13.15

(Gruppen, group 157)





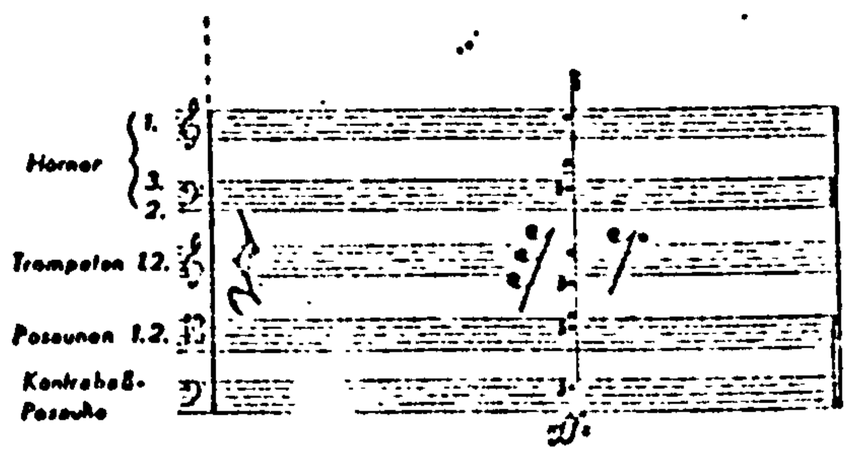
However in groups 156 - 157, 159 - 160 and 168 - 171 there are three further climaxes interspersed between which are quieter passages alluding to the six sections A to C*.

Sub-section D7 (groups 172 - 174)

These closing few bars may be further sub-divided into two. The first (groups 172 and 173) is characterized by short brass chords, starting sffz and getting as soft as ppp (Example 2.13.16).

Example 2.13.16

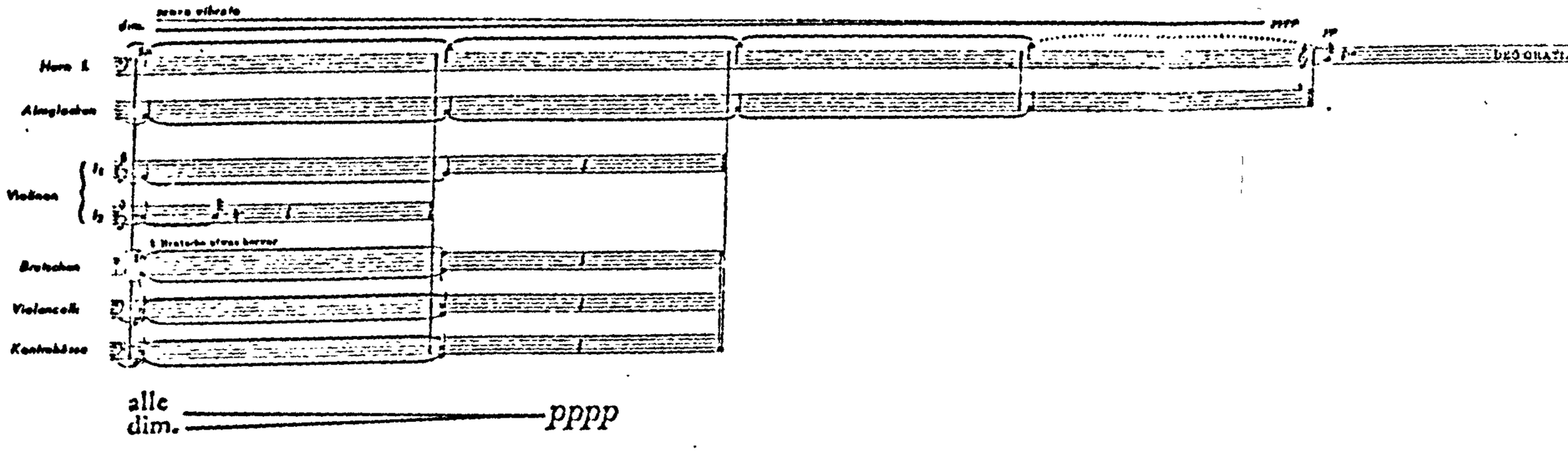
(Gruppen, group 173)



The second of these divisions consists of the closing group (174), played on the second orchestra. Against a ten-pitch chord on the strings which starts ppp and, after a crescendo to mf, fragments during a fall in dynamic intensity to pppp, there are some quiet murmurings on the drums and a cow-bell. Over this, two horns, starting on an augmented sixth diad, die away to a solo D♯, on the first horn, the final note being the last of the pitch-set - G, (Example 2.13.17).

Example 2.13.17

(Gruppen, group 174)



2.14 Klavierstück XI nr. 7

(Piano piece XI)

Year of composition : 1956

Forces required : piano

First performance : Darmstadt Summer School, 28th July, 1957

Duration : over 2 m. (usually c. 14 m.)

Of all Stockhausen's compositions Klavierstück XI must be one one of the best known - the enfant terrible for any pianist aspiring to play music from the avant-garde repertoire. An explanation of the format and performance of this work, composed of nineteen groups within a variable-form-structure, will not be given as these have been fully discussed by the composer.[48] However, it is necessary to draw the reader's attention to the method adopted by Stockhausen to differentiate between

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[48] Texte I, pps. 99 - 139

Texte II, pps. 69 - 70

the nineteen groups distributed at random over the single page. These groups may be subdivided into six categories as follows (Example 2.14.1): the group-number is that assigned in Example 2.14.2

Example 2.14.1

(Klavierstück XI, group distribution)

Type of group	A	B	C	D	E	F
Duration (♩)	3	6	10	15	21	c28
Groups	3 10 12 15	1 8 19	5 11 17	4 13 16	2 9 18	6 7 14

2.15 Gesang der Jünglinge nr. 8

(Song of the youths)

Year of composition : 1955 - 1956

Dedicated to : Doris Andrae

Forces required : electronic music (5-track tape)

First performance : W.D.R. (Cologne), 30th May, 1956

Duration : c. 13 m.

Gesang der Jünglinge consists of a fusion between sung notes and electronically sythesized notes. It is a setting of phonemes[49]

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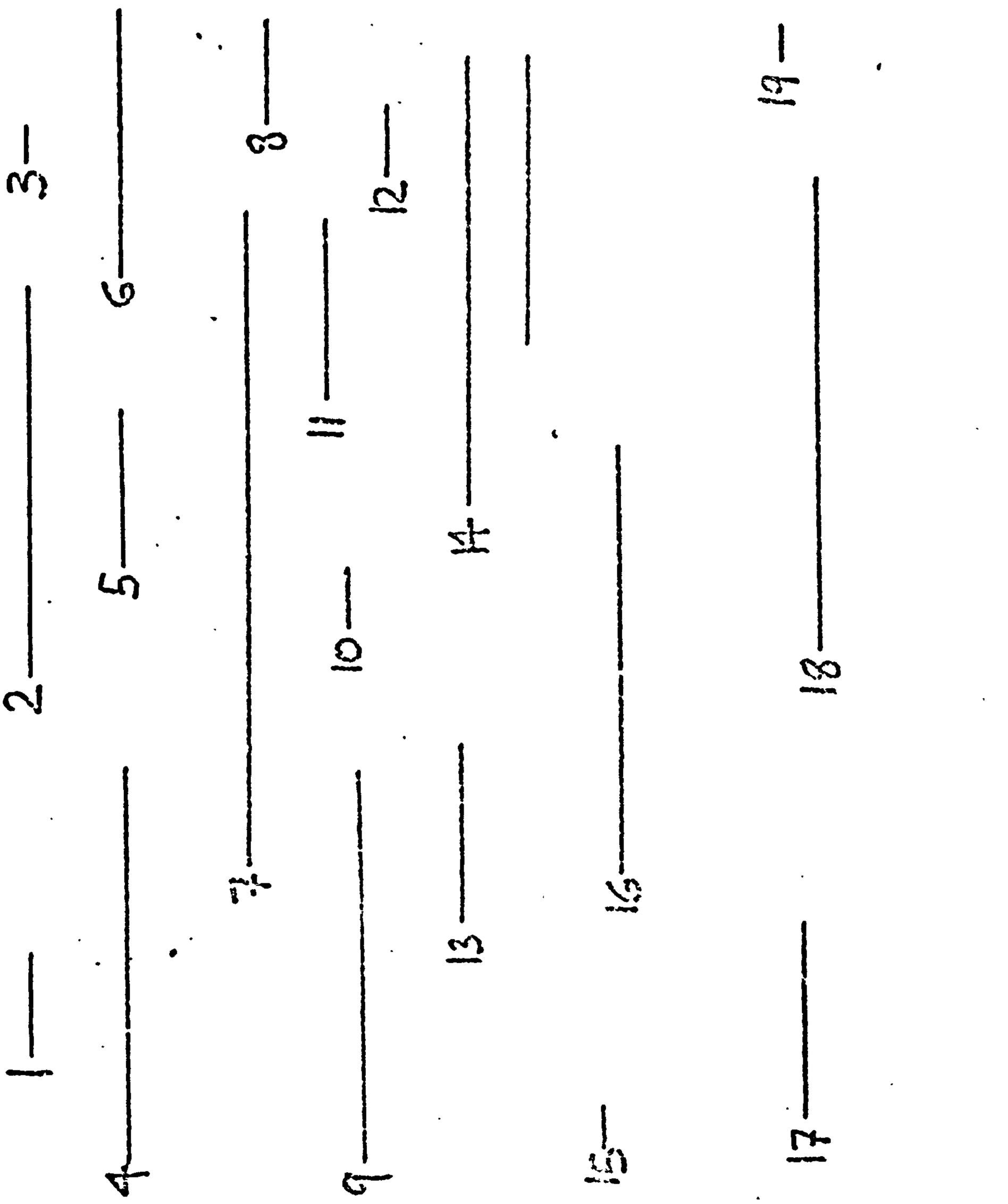
49 Phonemes are used in Momente, Refrain, Stimmung and Carré to denote the sounds used; further explanation of these may be found within "The Principles of the International Phonetic Association".

Example 2.14.2

(Klavierstück XI



and words taken from the first 17 verses of the "Benedicite"[50] in a German translation.

In view of the unavailability of a score of this work, the present writer feels that mere reiteration of that which Stockhausen has already written would be fruitless.[51]

2.16 Zyklus nr. 9

(Cycle)

Year of composition	:	1959
Dedicated to	:	Dr. Wolfgang Steinecke
Forces required	:	percussion (one player)
First performance	:	Darmstadt, 25th August, 1959
Commissioned by	:	This composition was submitted for the "Kranichstein Music Prize for percussion players, 1959."
Duration	:	10 m. - 16 m.

The present writer does not propose to deal with Zyklus as the composer has already provided detailed analytical notes on the work which explain the processes therein.[52]

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50 Otherwise known as "The Song of the Three" - an interpolation in the Greek version of the Old Testament between Daniel Ch. 3, v. 23 and v. 24; the seventeen verses set by Stockhausen may be found in the New English Bible (The Apocrypha) on pps. 202 - 203, vvs. 35 - 51.

51 Gesang der Jünglinge : record sleeve DGG 138811
Aktuelles : Texte, Band II, pps. 51 - 57
Musik und Sprach III : Texte, Band II, pps. 58 - 68

52 Texte, Band II, pps. 73 - 100

2.17 Carré nr. 10

(Square)

Year of composition	:	1959 - 1960
Dedicated to	:	Herbert Hübner
Forces required	:	four orchestras and choruses[53]
First performance	:	N.D.R. (Hamburg), 28th October, 1960
Commissioned by	:	N.D.R. (Hamburg)
Duration	:	30 m. to 34 m.

Carré was planned by Stockhausen during his stay in the United States of America. It was conceived whilst he was flying aboard aeroplanes to and from his work:-

> "Ich erlebte über den Wolken die langsamste Veränderungszeit meines Lebens"[54]

(Indeed the work is relatively extensive both in the duration of the performance and in the amount of time devoted to the events within). During this period Stockhausen was very busy and so Cornelius Cardew assisted him in the creation of the score.[55] The process consisted of Stockhausen sending Cardew, in Cologne, manuscript pertaining to Carré, including over a hundred small diagrams which later became the outlines for the individual groups (Example 2.17.1). After working with these and Stockhausen for several months, Cardew was almost at the point of

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53 For exact forces required see within the four scores.

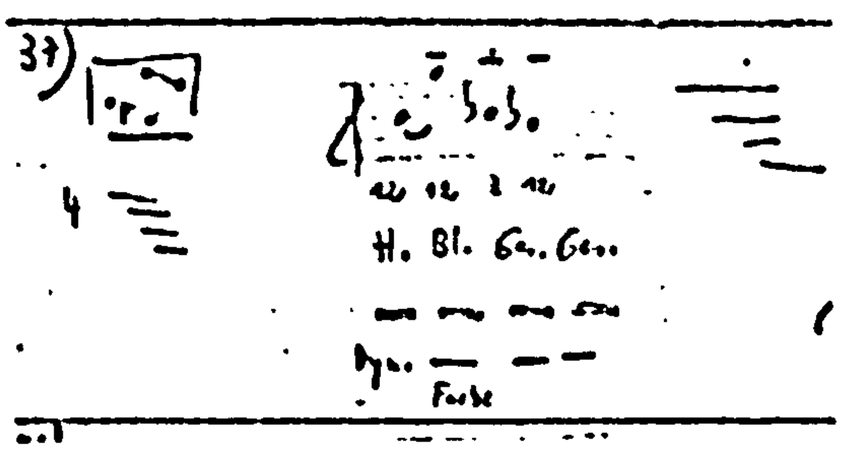
54 Texte, Band II, p. 103 "I experienced the longest transformation of time in my life."

55 Cardew's own account of this collaboration may be found in his article: "report on stockhausen's 'carré'" in "The Musical Times," 1961, pps. 619 - 622; 698 - 700.

realizing the score when certain episodes had to be incorporated[56] - this delayed the score's completion until March, 1960.

Example 2.17.1

(Carre)



Before proceeding to a brief résumé of the formal processes at work within this variable-form-structure composition it is worth mentioning that during his discussion on "Line, plane and orientation in Space" Paul Klee refers to Hodler's painting "Carré"[57]: since Klee seems to have had a profound influence on Stockhausen's thinking the question of the effect of this disorientated picture upon the synthesis of Carré arises.

Within each of the 101 groups, and their sub-groups, Stockhausen uses certain prescribed pitches (Example 2.17.2). These pitches operate in any orchestra except where specified otherwise: they form a repeating aggregate. Furthermore the rotation and application of parameters within the orchestras follows a strictly imposed pattern. The opening four groups are given, firstly as Stockhausen's sketches[58] and then, in

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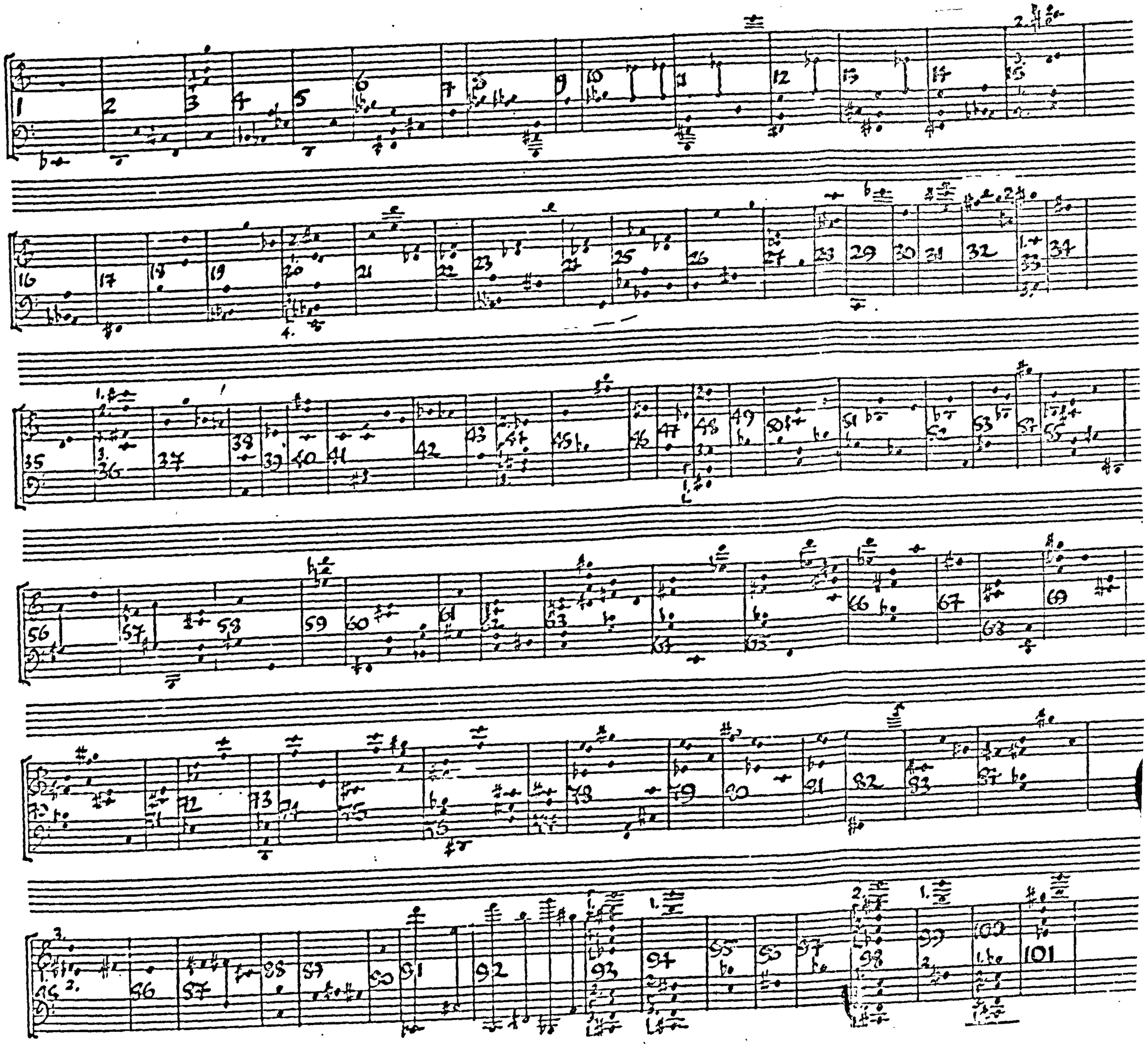
56 op. cit. pps. 698 - 700

57 Das bildnerische Denken, pps. 123 - 149, esp. p. 149

58 The remaining groups may be found on the outside covers of the scores of Carré, orchestras III and IV.

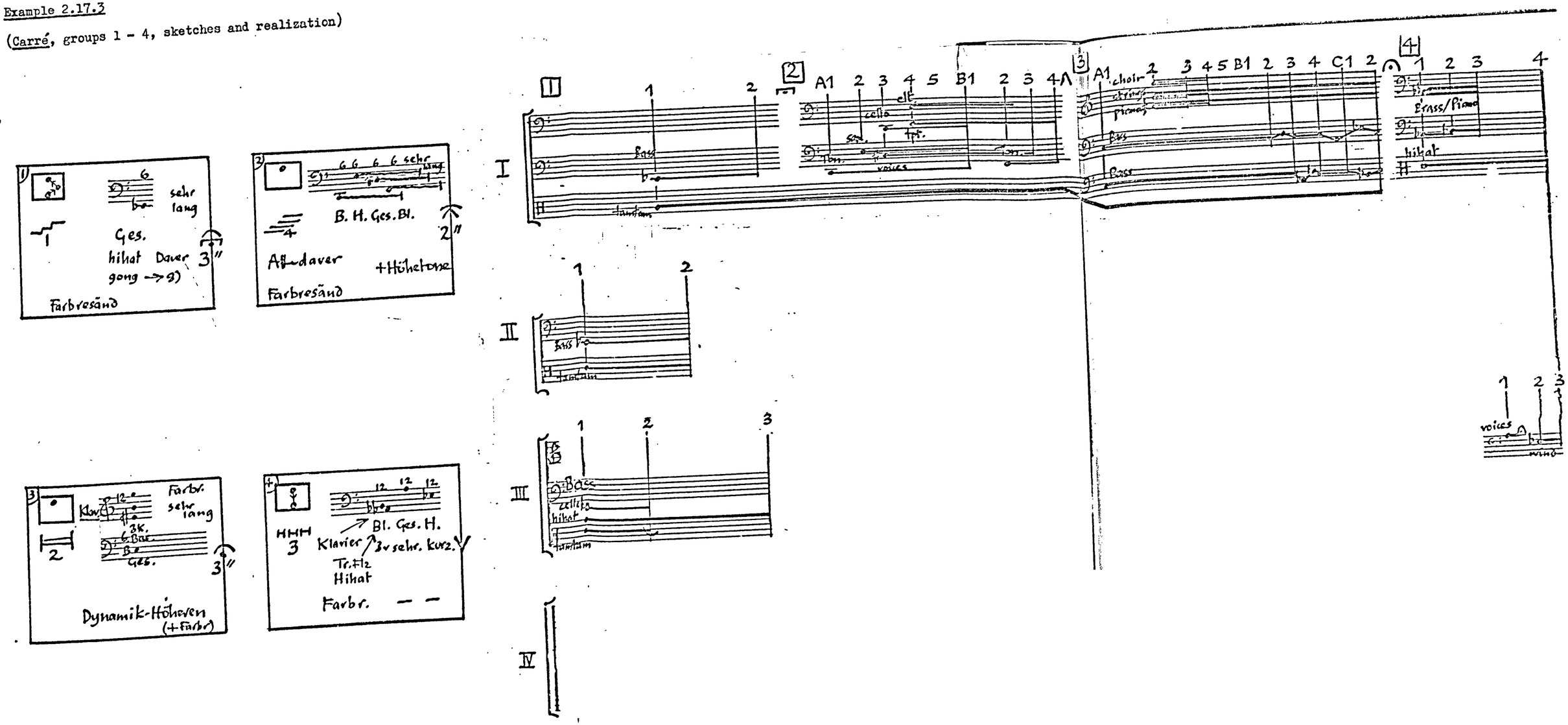
Example 2.17.2

(Carré, sequence of pitches)



Example 2.17.3

(Carré, groups 1 - 4, sketches and realization)



reduced score, as their interpretation (Example 2.17.3) From these examples it is easy to see that there is at work within Carré a great deal of control over the parametric distribution. A detailed analysis is not given as the above examples demonstrate the processes at work within Carré that are innovatory.

2.18 Refrain nr. 11

(Refrain)

Year of composition	:	1959
Dedicated to	:	Ernst Brücher[59]
Forces required	:	Piano (wood-blocks), celeste(antique cymbals), vibraphone (cowbells and glockenspiel)
First performance	:	Berlin, 2nd October, 1959
Commissioned by	:	Dr. G. von Westerman for the "Berlin Festival".
Duration	:	8 m. - 9 m. or 11 m. - 12 m.[60]

As mentioned in Chapter One,[61] Refrain is a polyvalent work, although it naturally shows its heritage of variable-form-structure characteristics. An instance of this would be the method adopted in the determining of duration: after a note (or notes) of specific dynamic intensity has been sounded the next note(s) may not follow until the

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59 Sometime head of "DuMont Schauberg", publishers of Texte and printers, on behalf of Universal Edition, of the scores of Zyklus and Refrain.

60 The longer timing applies if the celeste is amplified.

61 p. 22

decay has reached a prescribed level. The polyvalence inherent in Refrain is really quite simple: a static field of sound (the printed score) has superimposed on it, at times designated by the location of the perspex strip, a dynamic refrain; this strip may be located within a whole arc of the score. In Texte, Band I,[62] Stockhausen gives three different attitudes of the strip which were used in performance: firstly by A. Kontarsky, Cardew and Rockstroh (with location selected by Cardew), secondly by Tudor, Cardew and Rockstroh (again the location was selected by Cardew) and thirdly by both Tudor, Stockhausen and Caskel, and A. Kontarsky, B. Kontarsky and Caskel (this time the location was selected by Stockhausen).

Since composing Refrain Stockhausen has had second thoughts about his original rules for performance. The first recording, based on the written score, (Time 58001) gives the impression that Refrain is a placid piece of wall-paper musak, the second (STGBY 638), uses Stockhausen's new rules (the changes are printed on the record sleeve) and gives an impression of:-

> "Ein stiller, statischer Klangzusammenhang wird sechsmal durch einen variierten Refrain "gestört"!"[63]

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62 Texte, Band I, pps. 244 - 249

63 Texte, Band III, p. 27.

"A still, static sound-continuum which is "modified" six times by a varied refrain."

2.19 Kontakte nr. 12 and 12½

(Contacts)

Year of composition	:	1958 - 1960
Dedicated to	:	Dr. Otto Tomek
Forces required	:	nr. 12 - electronic music (4-track tape) nr. 12½ - electronic music (4-track tape) piano and percussion[64]
First performance	:	Cologne, 11th July, 1960
Commissioned by	:	W.D.R. (Cologne)
Duration	:	34 m. 31.8 s.

Electronically, Kontakte consists of a four-track tape montage. This tape was made by the composer, assisted by Georg Michael König, in the electronic studios of W.D.R. (Cologne) during the ten months between September 1959 and June, 1960, although the composition had been gestating for some months previously.

The work exists in three different forms.

The first of these is the four-track tape of electronic sounds, from which the composer adapted stereo and mono versions for reproduction either over the air or on disc. Since it forms an integral part of Kontakte nr. 12½ it will not be considered separately.

The second, and perhaps the best known version, is for the four-track tape realization along with two instrumentalists who play metal, wood and membrane percussion instruments and piano: it is in this version that Kontakte was first publicly performed during the 34th I.S.C.M. Festival.

The third, and least known, is retitled Originale, and is a

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[64] For full details of the instruments played by the pianist and percussionist see the score.

setting of parts of Kontakte as a piece of musical theatre: it was commissioned by the Cathedral Theatre, Cologne, receiving its first performance there on 26th October, 1961 after the production of Caspari: it is dedicated to Mary Baumeister.

The title Kontakte is significant, as indeed has been seen to be the case in other works by Stockhausen. Kontakte - contacts between electronic sounds and instrumental sounds, not only from tape to player but on the tape itself; the tape has piano and percussion sonorities to act as sign-posts in the electronic medium.[65] Contacts also between the autonomous and spatially-orientated sounds.

For a performance of Kontakte Stockhausen has laid down fairly rigorous conditions as regards placement and orientation of loudspeakers and their output. The speakers should be either in the corners, or at the cardinal points, of the hall, each as a distinct source (as opposed to his use of them in Stimmung in which the sounds should not have distinct origin). Using the four-track version the composer recommends an output of one watt per seat, so in a hall of 1,000 seating capacity each channel would be emitting 250 W.

The electronic sounds are produced using an impulse generator, with which the composer could vary the speed of the impulses at will between 16 and 1/16 impulses per second, and the duration of the impulses between 10^{-4}s. and 0.9 s. Other electronic gadgetry includes a narrow filter with continuously variable decay and band-width, an adjustable band-filter, sine-wave and square-wave generators, echo, ring-modulation, etc.

The output from the impulse generator may be accelerated or slowed down to give a scale of transformation from complete noise, or its absence, to a rate of change of event so slow that their connection

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65 As was the case with the human voice in Gesang der Jünglinge

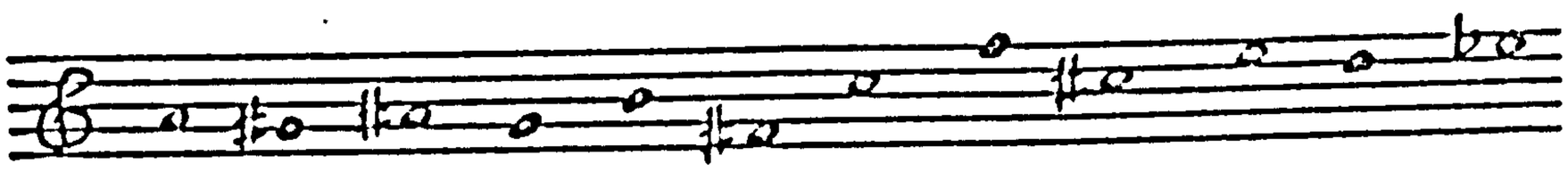
is a purely esoteric experience for composer, performers and listeners alike.[66]

As has already been mentioned this technique of changing the rate of the event has been one of Stockhausen's main tenets and practices in music over since the middle of the fifties and may readily be seen in Kontakte in the passage from 17 m. 0.5 s. to 18 m. 36.5 s. in which the composer arrives on an F♯ then an E as a result of this process (Example 1.9.1).

In Kontakte the piano and pitch-notated percussion parts are composed within a very well-known set - that which expands by a semitone in the opposite direction each time (Example 2.19.1). This set is not taken the same each time, but rather the pitch-classes are permutated within the aggregate during the course of the piece (Example 2.19.2).

Example 2.19.1

(Kontakte, pitch-set)



Towards the end of the fifties Stockhausen's development of form was closely bound up in his attempts to create a mobile score in which the individual elements could follow each other in various sequences such that those elements would be capable of being regarded as discreet entities.

His new attitude to music required a change from quantitative musical thought, such as is present in total serialism's organization of

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66 see Chapter 1.11

Example 2.19.2

(Kontakte, sequence of pitch-aggregates)

Within this example each pitch of the pitch-set is assigned a number from 1 to 12, each horizontal line represents an aggregate (certain notes have been excluded which are repetitions of previously used pitches)

					6	7	8	9	10	11	12
1	2	3	4	5	6	7	8	9	10	11	12
1	2	3	4	5	6	7	8	10	9	11	12
1	2	3	4	5	6	7	8	9	10	11	12
1	2	3	4	5	6	7	8	9	10	11	12
1	2	3	4	5	6	7	8	9		11	12
1	2	3	4	5	6	7	8	9	10	11	12
1	2	3	4	5	6	7	8	9	10	11	12
1	2	3	4	5	6	7	8			11	12
1	2	3	4	5	6	7	8	9	10	11	12
1	2	3	4	5	6	7	8	9	10	11	12
1	2	3	4	5	6	7	8	9	10	11	12
1	2	3	4	5	6	7	9	10	11	12	8
1	2	3					8	10	11	12	9
1	2	3	4	5	6	7	8	9	10	11	12
1	2	3	4	5	6	7	8	9	10	11	12
1	2	3	4	5	6	7	8	9	10	11	12
1	2	3	4	5	6	7	11	10	9	8	12
1	2	3	4	5	6	7	8	9	10	11	12
1					6	7	8	9	10	11	12
1	2	3	4	5	6	7	8	9	10	11	12
1	2	3	4	5	6	7	8	9	10	11	12
1	2	3	4	5	6	7	8	9	10	11	12
1	2	3	4	5	6	7	8	9	10	11	12
1	2	3	4	5	6		8	9	10	11	12
1	2	3	4	5	6	7	8	9	10	11	12
1	2	4	3		6		8	9	10	11	12
1	2	3	4	5	6	7	8	10	9	11	12
1	2	3	4	5	6	7	8	10	11	12	9
2	1	3	4	5	6	8	10	7	9	11	12
1	2	4	3	5	6	8	10	7	9	11	12

Example 2.19.2 (Continued)

2	4	1	3	5	6	8	10	7	9	11	12
2	4	1	3	5	6	8	10	7	9	11	12
2	4	1	3	5	6	8	10	7	9	11	12
2	4	1	3	5	6	8	10	7	9	11	12
1	3	2	4	5	6	7	9	8	10	11	12
1	3	2	4		6	7	9	8			
		2		5	6	7	9	8	10	11	12
1		3			6	7	8	9	11	10	12
1		3	5	4	6		7		11	10	12
1	2	3	4	5	6	8	7	9	11	10	12
2	1	3	5	4	8	6	7	9	11	10	12
2	1	3	5	4	6	7	9	8	11	10	12
2	1	3	5	4	6	7	9	11	8	10	12
2	1	3	5	4	6	8	7	9	11	10	12
2	1	3	5	4	6	7	9	8	11	10	12
2	1	3	5	4	6	8	7	9	11	10	12
2	1	3	5	4	6	8	7	9	11	10	12
2	1	3	5	4	6	8	7	9	11	10	12
2	1	3	5	4	6	8	7	9	11	10	12
2	1	3	5	4	6	8	10	9	11	7	12
2	1	3	5	4	6	8	7	9	11	10	12
2	1	3	5	4	6	8	7	9	11	10	12
2	1	3	5	4	6	8	7	9	11	10	12
2	1	3	4	5	6	7	8	9	10	11	12
1	3	2	4	5	6	7	9	8	10	11	12
1	3	2	4	5	6	7	9	8	10	11	12
1	3	2	4	5	6		9		10	11	12
1	3	2	4	5	6	7	9	8	10	11	12
1	3	6	4	7	2	5	9	8	10	11	12
3	1	2	4	5	6	8	9	7	10	11	12
1	3	2	4	5	6	7	8	10	9	11	12
1	2	4	3	5	6	7	8	10	9	11	1
12	2	4	3	5	7	6	8	10	9	11	12
1	2	4	3	5	7	6	8	10	9	11	1
2	12	4	3	5	7	6	8	10	9	11	1

Example 2.19.2 (Continued)

2	12	4	3	5	7	6	8	10	9	11	1
12	2	4	3	5	7	6	8	10	9	11	1
12	2	4	3	5	6	7	8	10	9	11	1
12	2	4	3	5	7	6	8	10	9	11	1
12	2	4	3	5	7	6	8	10	9	11	1

all parameters in fixed degrees, to a method based on qualitative relationships between moments.

Although mobility had been introduced in works such as Klavierstück XI, Zyklus and Refrain, the first most systematic use of this principle is in Kontakte. Scales of transformation are used for parameters such as speed, register and dynamic intensity. In its original conception this work is divided into 18 large structures, or moment-groups, each one further divided by six to make a total of 108 moments - related to each other by a degree of change from 1 to 6, that is to say, by a degree of change of each parameter. The work's form is arranged as an hierarchy within which degrees of variation in individual parameters of the sub-moments add up to define the overall degree of variation for that moment which, in turn, adds up to characterized degrees of variation in the main moment-groups. These degrees of variation are always changes in the quality of the sound which, in the case of spatial movement, are defined by the addition or subtraction of sound sources.

As mentioned in the previous paragraph, each of these moments is further sub-divided. This may easily be seen if reference is made to the first 39.3 s. of the work (Example 2.19.3). The first moment is divided into two "Teilmomenten",[67] the first of these lasting for 10.4 s.

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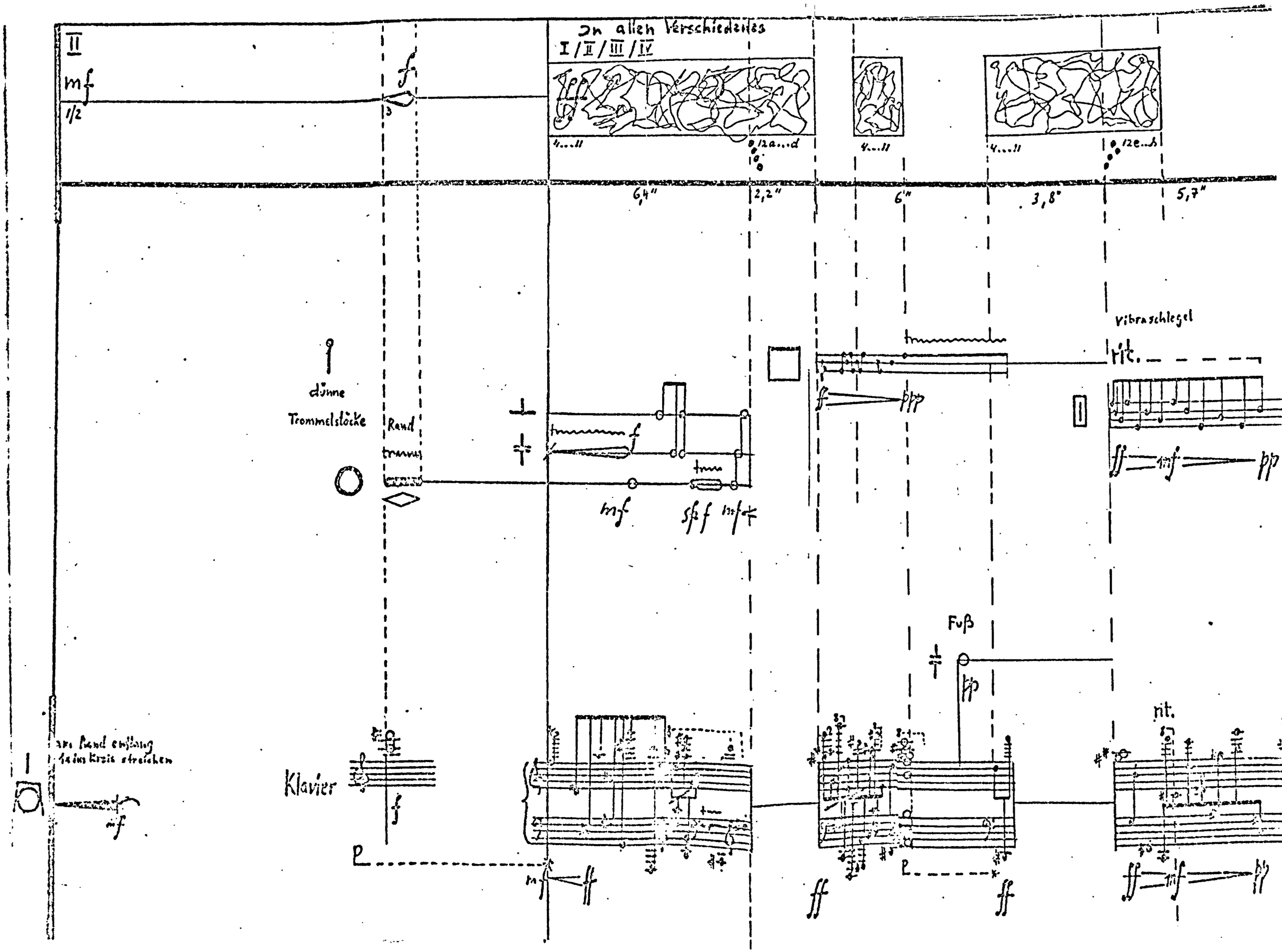
[67] sub-moments

Example 2.19.3

(Kontakte, 0 m. 0 s. to 39.3 s.)



and consisting of a tam-tam set in motion with a metal beater along with an electronic effect.[68] The second, lasting 5.3 s., contains a cluster attack on the piano coincident with an attack on a small tam-tam with a drum-stick and an electronic sound.

The second moment lasts for 23.6 s. and contains six sub-moments. A pitch analysis of these two moments is given (Example 2.19.4) in order that the use of the aggregate may be demonstrated, (no transposition occurs in the work - merely permutation). The following four moments (as far as 2 m. 10 s.) consist, basically, of single vertical sounds. This first moment-group lasts 2 m. 10 s.

Further discussion of the moment-groups in sequence will not be given, rather a consideration of the main types of process used within Kontakte will be presented.

Stockhausen differentiates between six types of moment in Kontakte:-

> "Ein Moment kann - formal gesehen - eine Gestalt (individuell), eine Struktur (dividuell) oder eine Mischung von beiden sein; und zeitlich gesehen kann er ein Zustand (Statisch) oder ein Prozess (dynamisch) oder eine Kombination von beiden sein."[69]

Stockhausen then goes on to give an instance of each of these six possibilities. They are given here, taken from the score, with a

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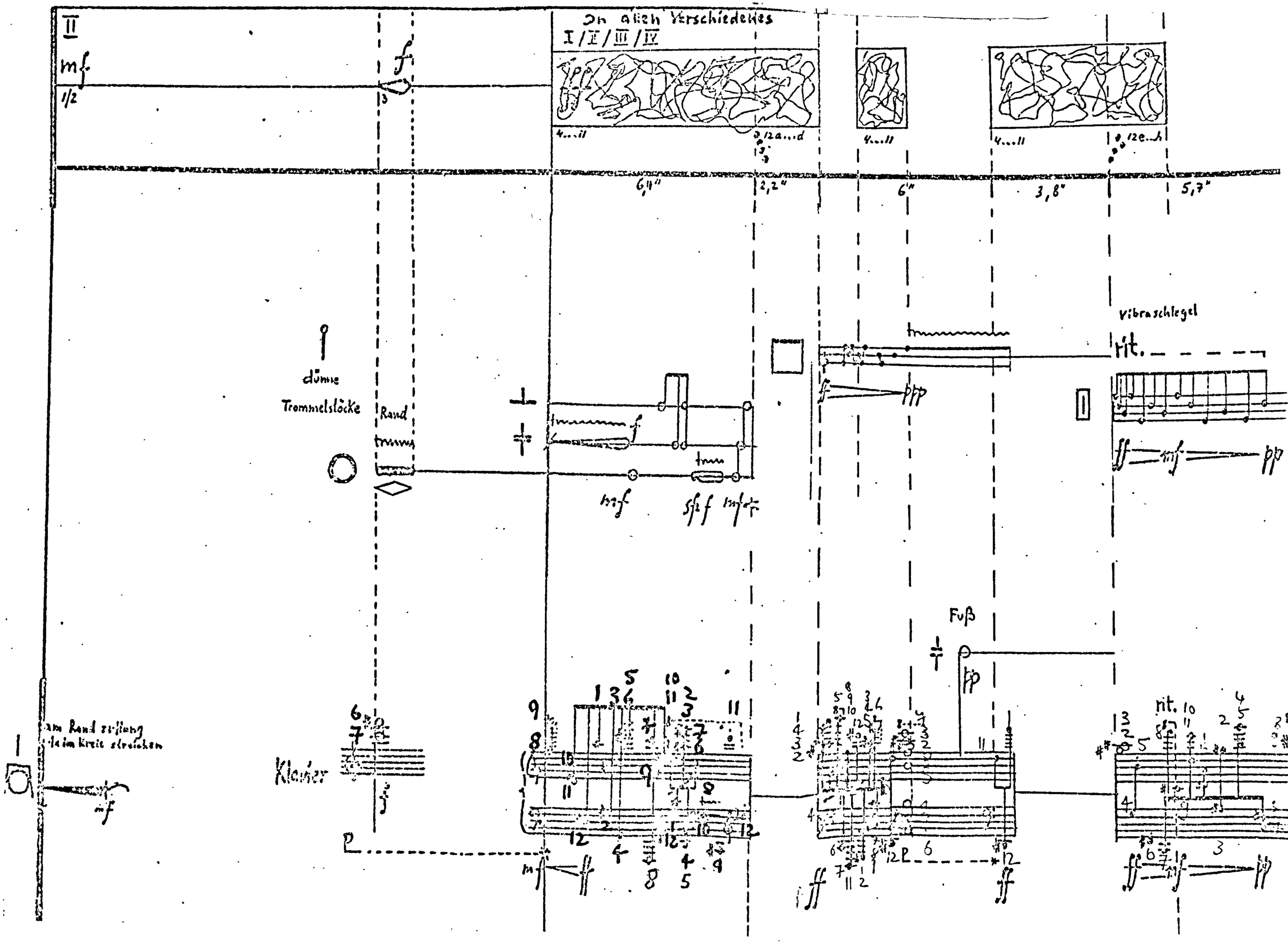
68 technical explanations of these effects will not be given in the text as they may be deduced from the realization-score.

69 Texte, Band I, p. 201

"Formally, a moment may be an individual shape, a dividual conformation or a fusion of both; the moment may also exist as a static state, a dynamic process or a combination of both."

Example 2.19.4

(Kontakte, 0 m. 0 s. to 39.3 s., pitch analysis)



commentary, in order that Stockhausen's compositional process may be fully illustrated.

(1) Gestalt im Zustand (an individual shape in a static envelope) (Example 2.19.5).

This moment is linked to the following one by one sound. All the sounds in this moment are united by their possessing similar timbres and dynamic intensities. The envelope is an homogeneous band of sound-density.

(2) Gestalt als Prozess (an individual shape as a process), (Example 2.19.6).

The individuality of this moment is the sound-complex which emerges from all four speakers and lasts for approximately one second. It consists of an ascending glissando which tails off at the top. The dynamic process is the rotation of a sound, through the speakers, which increases in both dynamic intensity and amplitude.

(3) Struktur als Zustand (conformation within a static envelope), (Example 2.19.7).

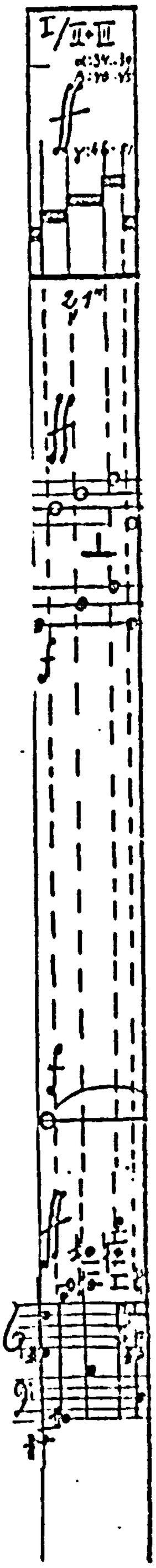
The conformatory aspect of this moment may be seen in the repetition of the isolated sound-points and small groups of pitches, the repetition of two different timbral effects and of similar intervals. The static envelope of this moment is typified by the use of median durations and intervals between events - no sudden bursts of activity or expansions of time. The dynamic intensity is neither extremely loud or soft - again, it lies in the middle range.

(4) Struktur als Prozess (conformation as a process), (Example 2.19.8).

The conformation within this moment may be detected in the repetition of sound-points with equal durations and accents, and in the repetition of static sound-complexes (e.g. the piano groups). The dynamic process is easily seen in the explosions of tone-cluster-complexes, which become smaller, slower and quieter throughout the

Example 2.19.5

(Kontakte, 7 m 23.5 s. to 7 m. 25.7 s.)

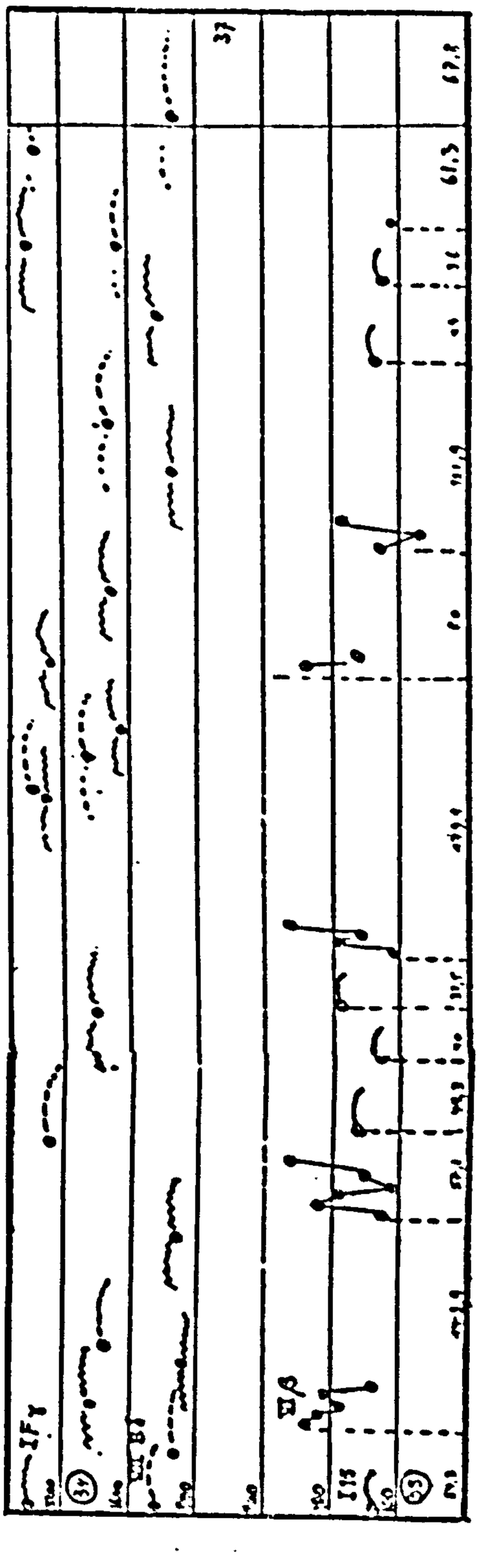


Example 2.19.6

(Kontakte, 26 m. 58.6 s. to 27 m. 02.8 s.)

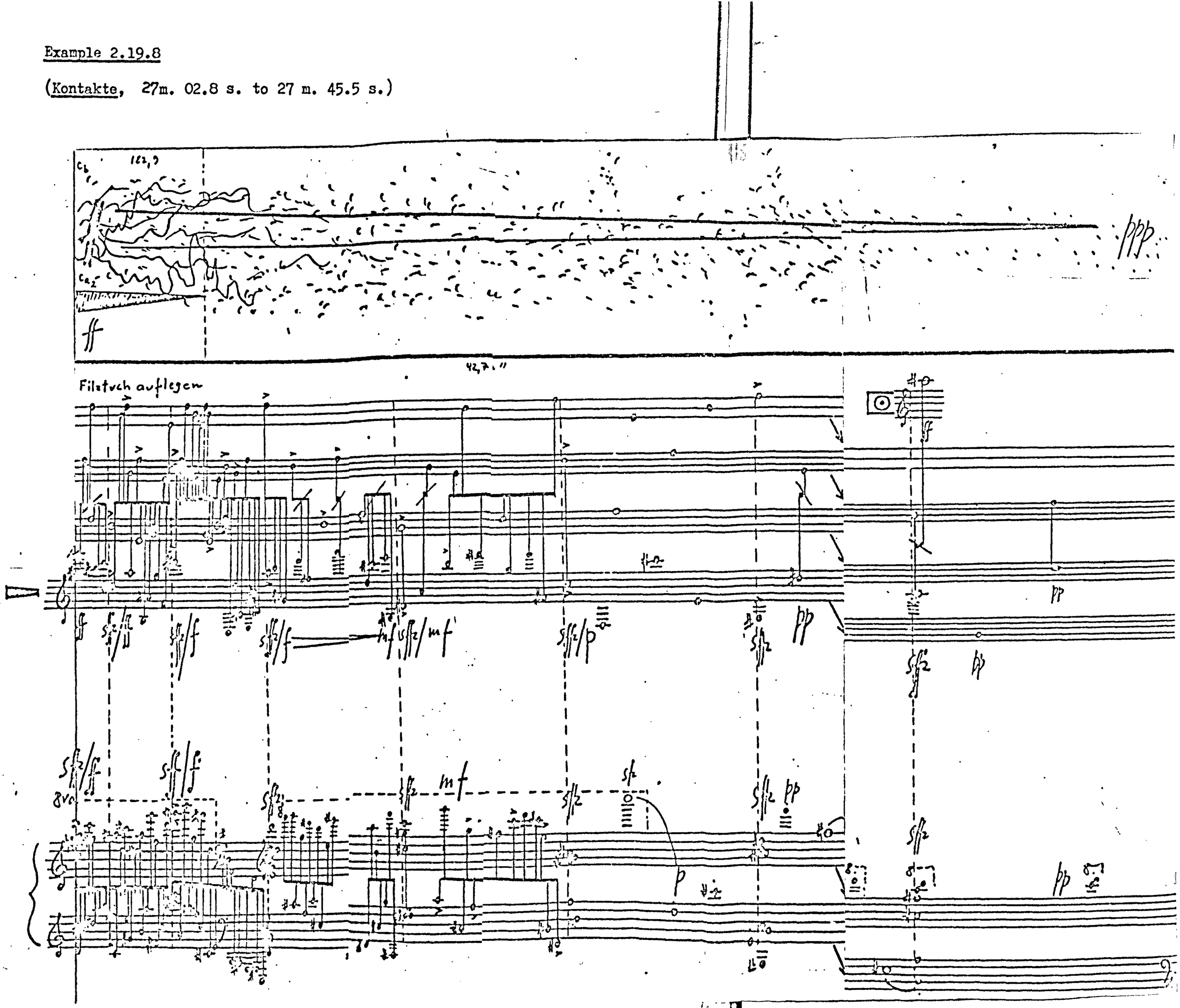
Example 2.19.7

(Kontakte, 16 m. 8.2 s. to 16 m. 33.6 s.)



Example 2.19.8

(Kontakte, 27m. 02.8 s. to 27 m. 45.5 s.)



moment, dying away beyond ppp.

(5) Mischung von Struktur und Gestalt als Zustand (a fusion of shape and conformation within a static envelope), (Example 2.19.9).

The shape of this moment may be seen in the eight attacks, each of different pitch-groups and duration decays which occur assymetrically throughout the moment: they are united by the single sustained pitch (1,262 Hz) coming from speaker IV - the other three being otherwise occupied. The conformational aspect of this moment is the repetition of the same timbre and pitches from attack to attack; they also come from the same loudspeaker. The overall envelope is one of no change in any of the said parameters.

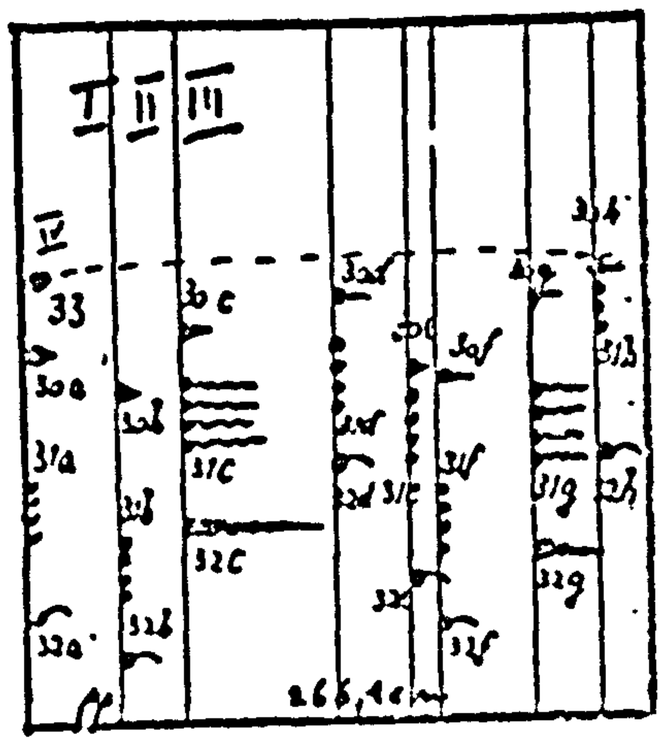
(6) Mischung von Gestalt und Struktur als Prozess (a fusion o shape and conformation within a dynamic process), (Example 2.19)

The shape of this moment is assembled as follows: a pro t decay of a percussive attack, together with a sequence of three different percussive attacks of different timbral composition duration. The conformation of this moment may be summed up as consisting of decoration of the "Gestalt" by means of quickly 3 attacks and pitches within a small band of sound; these pitch attacks have approximately equal duration and similar timbres, are almost regularly distributed throughout the moment. The process at work here is one of an increase in the length of dur of the time-intervals between attacks; the effect is given of slowing down of tempo and a relaxation of dynamic intensity: the piano part gives a good example of this with its band of s ascending from low pitches to high pitches - it slows down, be quieter and more relaxed.

An example of all six processes occurring in a complete

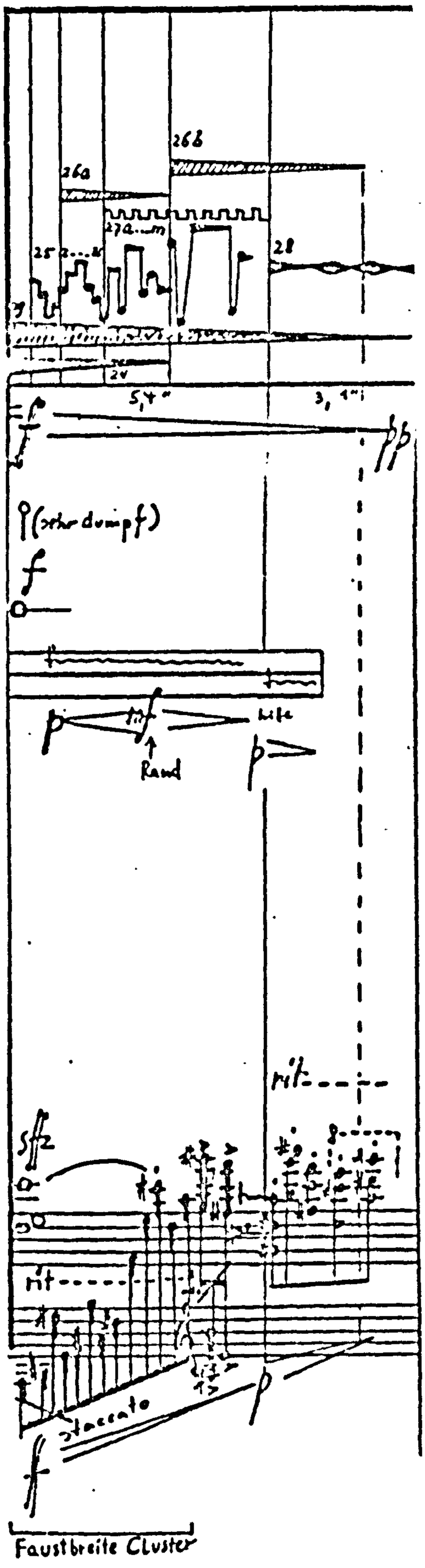
Example 2.19.9

(Kontakte, 16 m. 1.2 s. to 16 m. 8.2 s.)



Example 2.19.10

(Kontakte, 15 m. 52.7 s. to 16 m. 1.2 s.)



moment may be found in Texte.[70] It is worth mentioning that the timings given in the score and those in Texte inexplicably differ, as may be seen in the following table:-

Timings in the score		Timings in "Texte"	
21 m.	57 s.	21 m.	52 s.
	20.7 s.		20.7 s.
22 m.	17.7 s.	22 m.	12.7 s.
	7.9 s.		7.9 s.
	25.6 s.		20.6 s.
	4.8 s.		4.8 s.
	30.4 s.		25.4 s.
	15.7 s.		15.7 s.
	46.1 s.		41.1 s.
	7.1 s.		7.1 s.
	53.2 s.		48.2 s.
	10.7 s.		10.7 s.
23 m.	3.9 s.		58.9 s.
			7.1 s.
	40.2 s.	23 m.	6.0 s.
			38.1 s.
	44.1 s.		44.1 s.
	4.9 s.		4.9 s.
	49.0 s.		49.0 s.

From the previous examples the processes at work within Kontakte are evident.

As was mentioned towards the beginning of this study of Kontakte this work exists in three distinct versions. The third of these, Originale, will not be discussed here as the composer has himself written quite liberally on the subject,[71] and since the present writer has never

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[70] Texte I, pps. 203 - 204

[71] Texte, Band II, pps. 107 - 129

seen or heard a performance he feels unable to appraise it.

In Kontakte Stockhausen at last achieves the unity between macro- and micro-structures, which had been the unattainable goal of his work in the fifties; he succeeded in intertwining both overall form and compositional detail into a structural process based on scales of transformation. In contrast to the traditional dynamic form which has both a beginning and an end, Kontakte is a succession of moments which could, in theory, go on for ever: Stockhausen concluded Kontakte after c. 34 m. 31.8 s. as he had a definite date for first performance which he had to prepare for.

2.20 Momente nr. 13

(Moments)

Year of composition	:	nr. 13 - 1962 to 1964 nr. 13½ - 1963 to 1964 nr. 13 2/3 - 19** to 1972
Dedicated to	:	13 2/3 - Mary Baumeister
Forces required	:	soprano solo, four choral groups and thirteen instrumentalists[72]
First performance	:	nr. 13 - W.D.R. (Cologne), 21st May, 1962 nr. 13½ - Donaueschingen, 16th October, 1965 nr. 13 2/3 - Bonn, 8th December, 1972
Commissioned by	:	W.D.R. (Cologne)
Duration	:	c. 105 m.

Although Momente was originally conceived during January, 1962 in Sicily, it was December, 1972 when it first received a complete performance. By mid-May, 1962, all the K, M(m), MK(d), I(d) and I(m)

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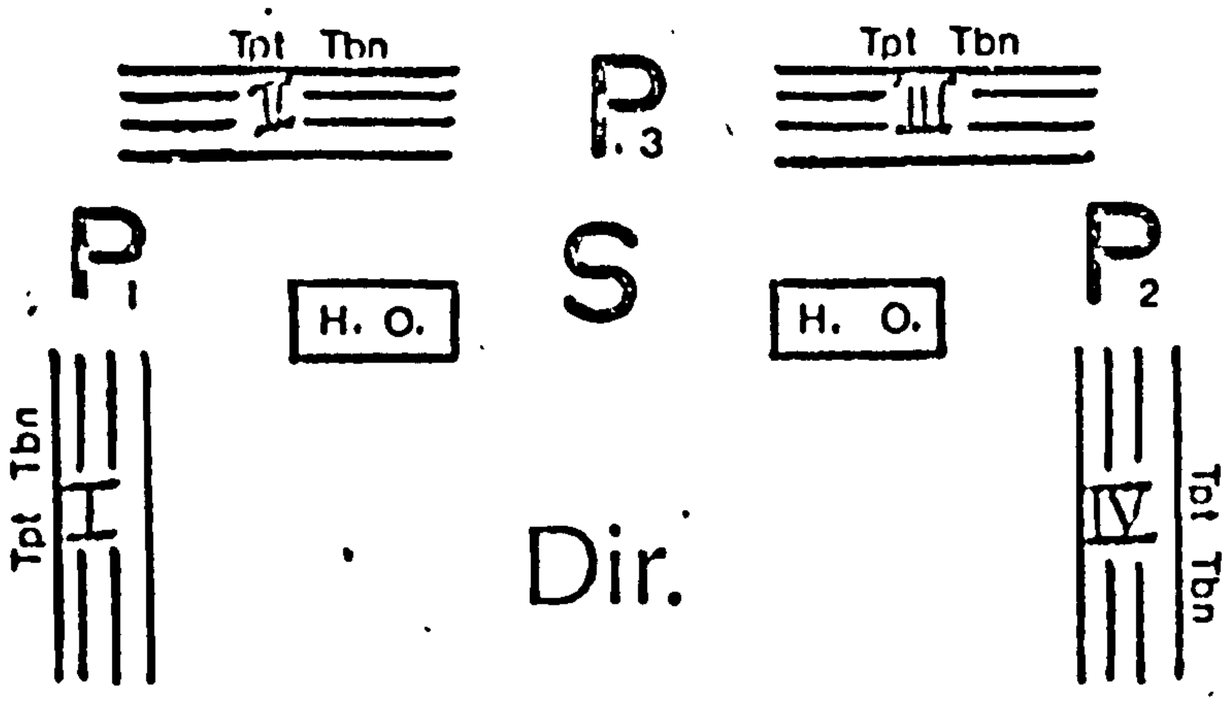
[72] the total forces required are given in the score.

moments had been completed (a total of c. 25 m. music). By October, 1965 Stockhausen had finished all the M moments along with the I moment, a duration of c. 60 m. The 1972 performance included all the previous moments along with the D and I(k) moments.

The layout of the ensemble is given in the diagram (Example 2.20.1).

Example 2.20.1

(Momente, lay-out of forces)



As well as vocalising and producing sounds on the body, the members of Choir I play either a tambour[73] or a cardboard-tube, one end of which has a taut paper membrane to produce a drum-like effect; each player uses either rubber-headed sticks or fingers. Choir II play claves, Choir III small plastic boxes filled with lead-shot (producing violent attacks or sea-like swishes) and Choir IV play metallic claves. Stockhausen has indicated that approximate scales of pitch be established for each choir's percussion instruments.

This work, lasting over 100 minutes, has a relatively sparse instrumentation for Stockhausen; however, on the subjective level, this

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[73] really a tambourine without the jingles

is not really noticed for two reasons. The first of these is because Stockhausen evinces so many different timbres from his resources, and the second is because the chosen ensemble is of great structural importance.

> "Ich finde deshalb auch, dass, die spezifische Auswahl und Zusammenstellung eines Instrumentariums für ein bestimmtes Werk sowohl für mich als aus für andere Komponisten unwiederholbar, unkopierbar bleiben sollte"[74]

Within Momente Stockhausen exploits, as never before, the many varied ways of producing sounds from his forces. Although in Carré and Gesang der Jünglinge he had tried to fuse vocal and instrumental music, it is in Momente that he really succeeds; no longer were instruments a classical accompaniment, voices a Beethovenian extension or both equal (as in Boulez, Nono and Gesang der Jünglinge[75]): a fusion into an homogeneous range of timbre was achieved. As Stockhausen wrote,[76] the vocalists use many different means to produce their sounds, setting up scales of transformation from unpitched vocalization (aspiration) to the commonly acceptable criterion of singing, from speech sounds to instrumental sounds, etc.

There are six different sources for the texts used in Momente:-

(1) Eternity: William Blake

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74 Texte, Band II, p. 131

"I also feel, therefore, that the exact choice and combination of the instrumental ensemble for a particular work should always be unique - uncopyable both by myself and by other composers."

75 Texte, Band II, Musik und Sprache I: Pierre Boulez, pps. 149 - 156
Musik und Sprache II: Luigi Nono, pps. 157 - 166
Musik und Sprache III: Gesang der Jünglinge, pps. 58 - 68

76 Texte, Band II, pps. 131 - 132

(He who binds to himself a joy
Does the winged life destroy;
But) he who kisses the joy as it flies
Lives in eternity's sun rise.

There are only two appearances of this text - M(d) and M. In both of these the text is sung by the solo soprano, later joined by a soprano from Choir I singing fragments from (2).

(2) The Sexual Life of Savages: Bronislaw Malingwski

This work consists of an ethnographer's account of the Trobriand Islanders, British New Guinea: short quotations are to be found in Momente.

(3) The Song of Songs

This text, also used in part in Gesang der Jünglinge, is here used in a translation by Martin Luther. It occurs throughout Momente with greater frequency than any other text. It is especially used in the D moment-group by the female singers. In the M moment-group the soprano solo sings brief extracts and in I(d) and I(k) fragments are whispered by the four ensembles of singers to produce a wonderful multicoloured web of sound, rather like that effect achieved by Benjamin Britten in the "Pleni sunt coeli" from the "Sanctus" of the War Requiem. In I(k) texts from "The Song of Songs" are contiguous to selections from (4).

(4) Letter: Mary Baumeister.

Karl Wörner's "fragments from a dear friend's letters"[77] are only to be found in I(k).

(5) Artificial nonsense words, often onomatopoeic, consisting of notated phonemes.

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77 Stockhausen: Life and Work: Karl Wörner, p. 67

(6) Other words; these may be divided into four categories:-

(a) Names from fairy stories, eg. rapuntsel MK

(b) Exclamations in German, e.g. so? warum? ja! M(k)

(c) Exclamations in other languages, e.g. pfui, da capo K (m)

(d) Invented names, e.g. dodi M(m).

As has been demonstrated in Chapter One, Stockhausen's development has always been logical, and in Kontakte and Moment (and to a lesser extent in Carré and Refrain), it is possible to trace his use of Moment-form wherein the parameters are no longer subject to the pitch-set formation: this would be worthless with so many unpitched, noise and percussive qualities in the music.

Within Chapter 1.7 moment-form-structure was described as being "completely different from formal structures such as rondo or sonata: they require certain formal elements such as first subject group, bridge, episode, codetta etc."[78]. All that is required in Moment-form is a model to establish the location and interaction of the parameters.[79]

Formally, Momente is composed of three large moment-groups which may be recognized by being written in capital letters: K (Klang - timbre), M (Melodie) and D (Dauer - duration). These three main groups have interposed between them four I groups (Informelle/indeterminierte). The form-scheme of the 1972 version of Momente is given in Example 2.20.2, the line indicating the direction taken in performance. Each group contains as central moment the purest version of K, M or D - the surrounding areas are composed by combining the properties of the various K, M and D moments in varying proportions. The process adopted is exactly the same

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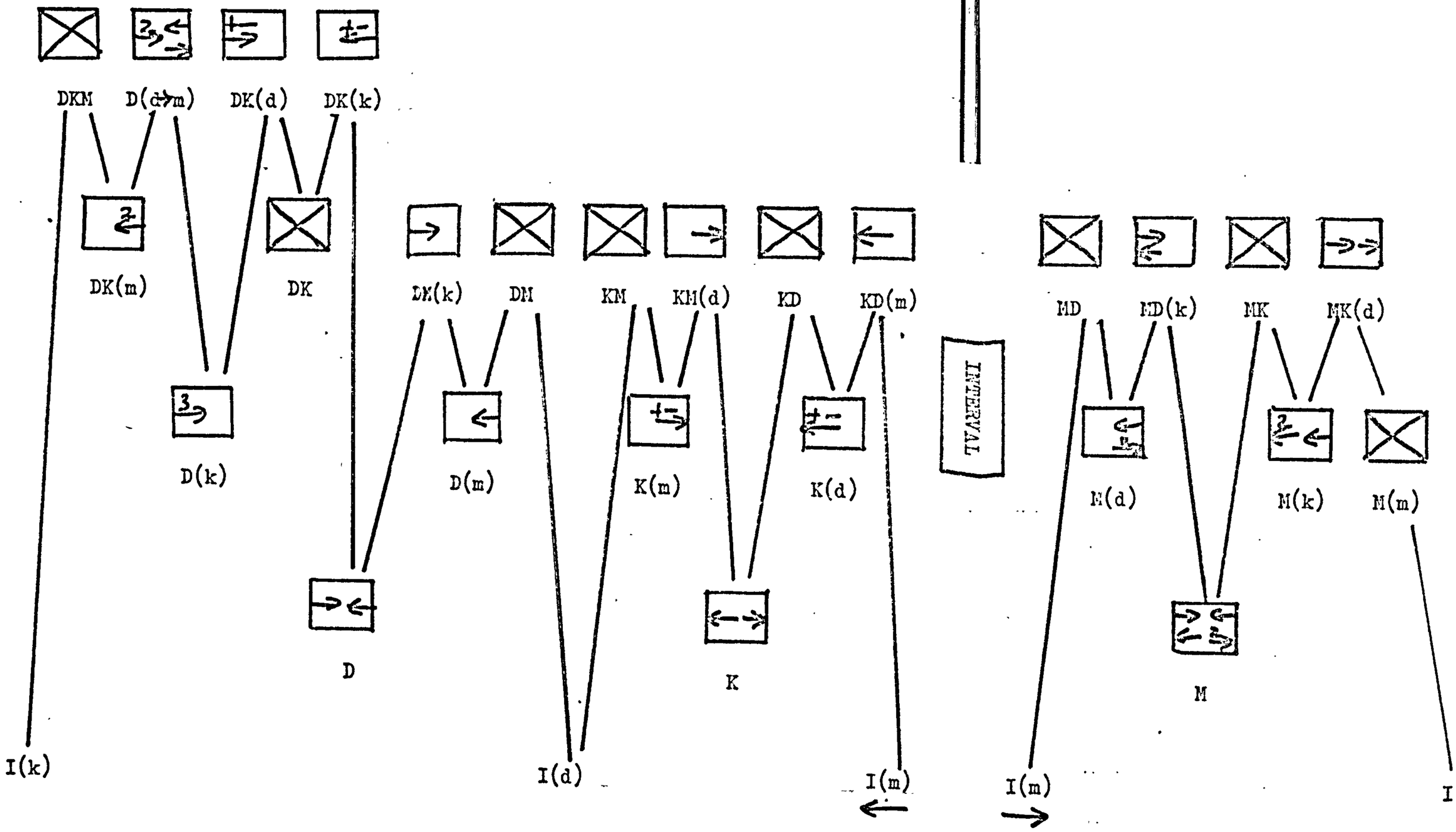
[78] p. 23

[79] p. 23

Example 2.20.2

(Momente,form-scheme for 1972 version)



for all three groups. The first stage is to combine the main features of a K, M or D moment with lesser characteristics of the other two basic moments. In this way the following moments are evolved: K(m), K(d), M(k), M(d), D(k), D(m) - these moments are indicated on the third level of the diagram (Example 2.20.2). The fourth level represents twice as many moments as the third (12), four to a group. Six of these moments contain equal qualities of the three basic moments: DK, DM, KM, KD, MD, MK. The other six add a smaller proportion of the remaining group: DK(m), DM(k), KM(d), KD(m), MD(k), MK(d). The fifth level contains only four moments, all in the D moment-group: DKM, DK(d), DK(k), D(d→m). DKM is the only moment which consists of equal proportions of all three groups (naturally there could only be one such). DK(d) and DK(k) are "rückkopplung"[80] moments. In the case of DK(d) this moment combines DK with a reflection of D; DK(k) is similar in construction, with a reflection of K on DK. D(d→m) moves from a reflection on D to one on M. The remaining third level moment, M(m), is a "rückgekoppelter"[81] moment, and is easily appreciated with the great conflict between vast parallel blocks of heterophony performed by all, and the simple monodic solo soprano part therein. The main characteristics of the basic groups are given in Example 2.20.3.

The I moments seem to have rules for location which conflict with performance, at least in the case of the Bonn version. According to the composer,[82] I(k) is always to be found between the K and D moment-groups and I(m) may be freely positioned either before or after I(k), or at the beginning: it may also be played straight or in retrograde.

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80 "feed-back" - Texte, Band II, p. 134 fn

81 "self-mirroring" - Texte, Band II, p. 134 fn

82 op. cit.

Example 2.20.3

(Momente, main characteristics of the moment-groups.)

Parameter	Moment-group		
	D (duration)	K (timbre)	M (melody)
Rhythm	irregular	regular	random
Timbre	pitched	unpitched	mixture
Dynamic Intensity	pp	ff	mf
Instruments	organs	percussion	brass
Vocalists	women	men	solo soprano
Direction of Movement	mixture	vertical	horizontal
Type of insert	receive	give	mixture

Moment I always comes as conclusion. If the sequence of moment-groups is as in Example 2.20.2, D-K-M, it follows that I(m) may be located either before or after I(d). On further consideration of that diagram the conflict becomes apparent: I(k) starts Momente and I(d) is located between D and K. One reason for this is that since Stockhausen wrote I(k) some ten years after the original form-scheme, he probably felt that he had the right to disregard the model[83] in favour of the musical necessity of an introductory passage: the soprano soloist singing such phrases as "Kommt herein" and "Hört die Momente, Musik der Liebe".

The previous paragraphs have indicated the existence within Momente of variable-form-structure. Further examples of this may be detected in the permitted variance of order given to the moment-groups: they may occur in the sequence DKM or the sequence MKD, in fact the 1962 version

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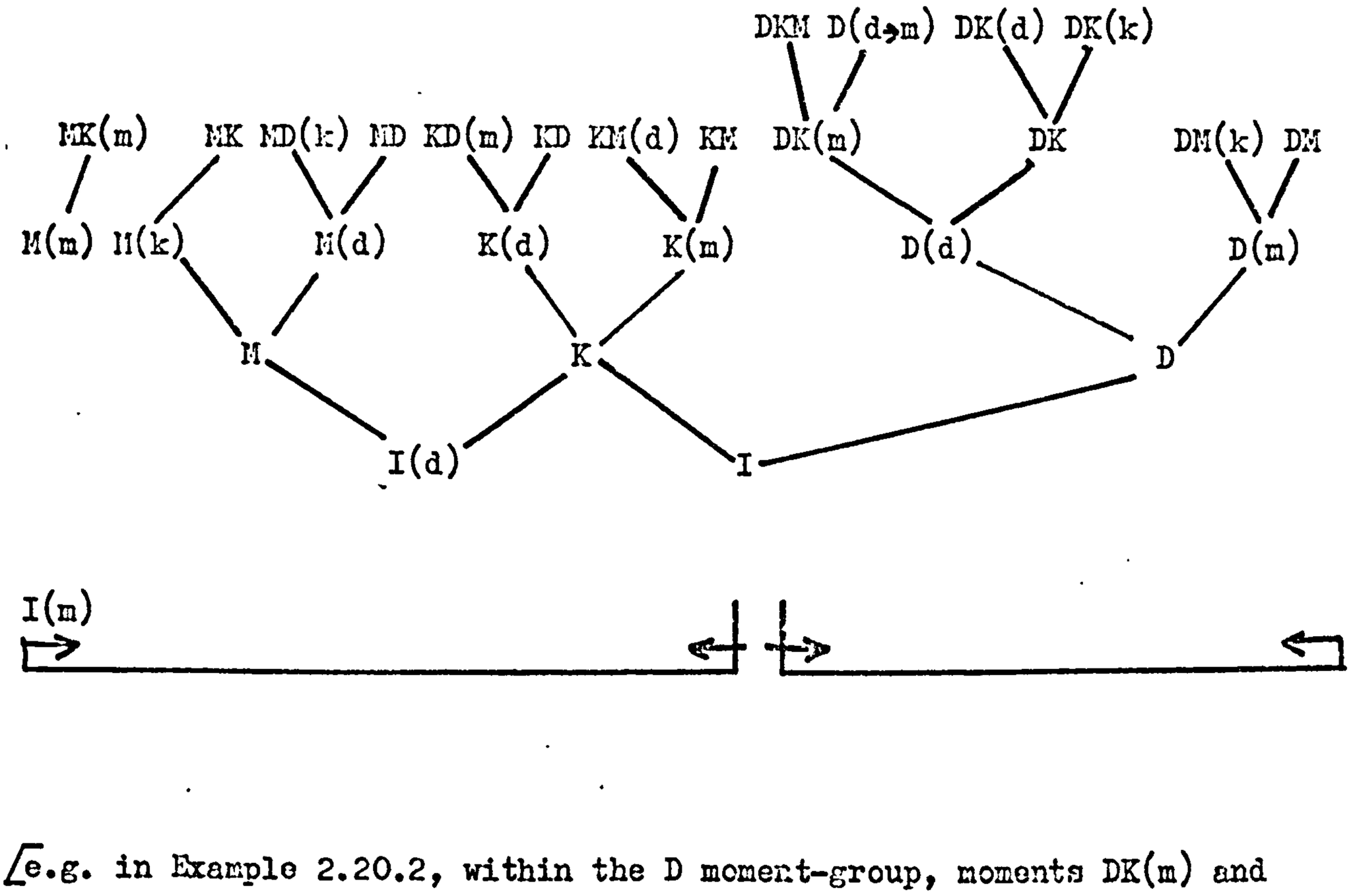
[83] see Chapter 1.7, p. 24

of Momente was in the latter order (Example 2.20.4). Similarly, all the moments within a moment-group may be transposed at the same level;

Example 2.20.4

(Momente, form-scheme for 1962 version)



[e.g. in Example 2.20.2, within the D moment-group, moments DK(m) and DK may be interchanged about D(k), and similarly DM(k) and DM about D(m), with the exception of K(m) which must always follow MK(d)].

After deciding upon a specific sequence of the moments for a particular performance, then the further influence of moment upon moment is determined according to the use of "Einschübe", an explanation of which is to be found in Appendix Two.

The present writer regrets that he has been unable to illustrate Momente with extracts of music: unfortunately the score of the whole work is unavailable (January, 1973).

2.21 Plus-Minus nr. 14

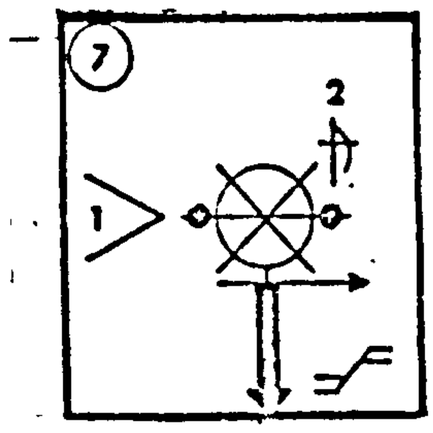
Year of composition	:	1963
Dedicated to	:	Mary Baumeister
Forces required	:	the score consists of 2 x 7 pages for elaboration
First performance	:	Rome, 14th June, 1964

Plus-Minus, the key work in process-form, is the first of Stockhausen's compositions in which the forces required for performance are left entirely at the discretion of the musical director. Stockhausen had to invent a completely new symbology to convey his wishes as regards the interpretation of the 2 x 7 pages.[84]

Within Plus-Minus there are several processes at work. There are seven shapes of event (Gestalttypen) (Example 2.21.2) within the composition which are used on the process pages, (Example 2.21.1). As the composer specifies, "Z" is equivalent to one of the seven chords on a note-page (Example 2.21.3), hence for each of the seven types of event there is one specific chord prescribed for the entire duration of the performance. Combined with these shapes of event are seven conformatory

Example 2.21.1

(Plus-Minus, a moment from a process-page)



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84 for an explanation of the symbology in Plus-Minus see the score

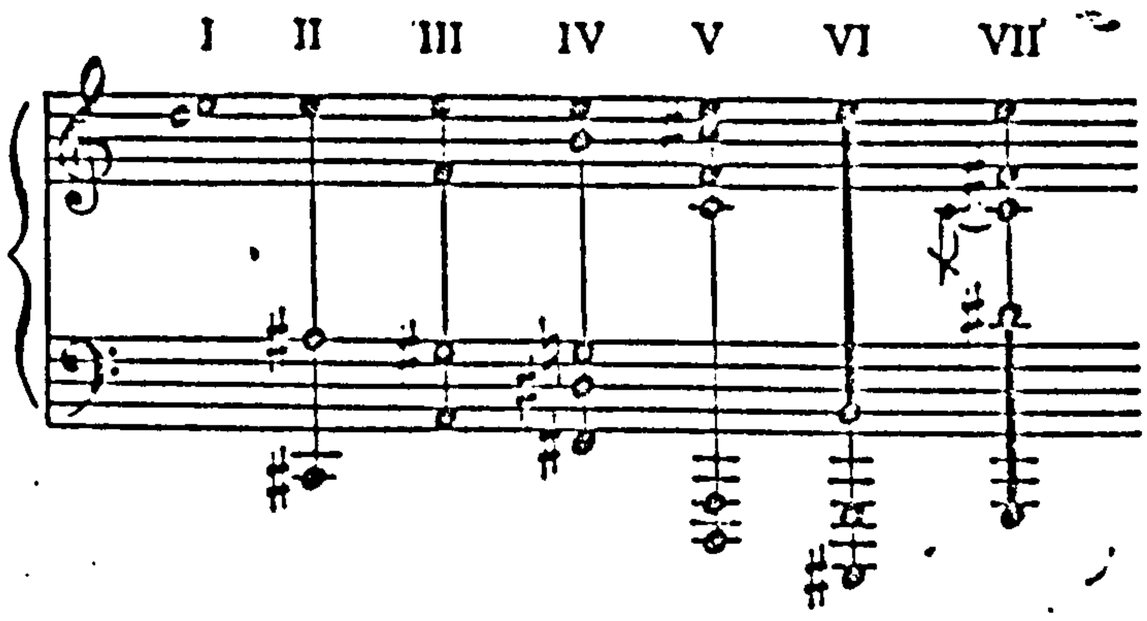
Example 2.21.2

(Plus-Minus, Gestalttypen)[85]

AZ $\frac{A}{Z}$ ZA AZA $\frac{A}{Z}$A A$\frac{A}{Z}$ A$\frac{A}{Z}$A

Example 2.21.3

(Plus-Minus, the chord symbology from a note-page)



segments (Strukturteilen), which indicate the number of repetitions associated with elements of the Gestalttypen: these are symbolized as flags with figures inside. The following example (Example 2.21.4), shows a Gestaltyppen with one such Strukturteilen.

. Transformations of the central sound, its accessories and secondary notes are affected by further symbology. The symbol (═══ or ═▸), with or without an associated figure regulates the amount of change undergone by such parameters as dynamic intensity, timbre, pitches selected and duration. Further transformations of parameters between layers of

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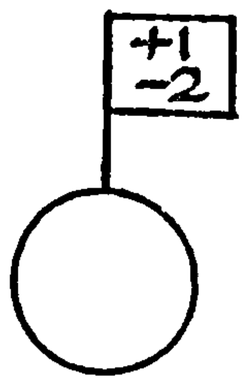
85 A - Akzidenten (accessories to the Zentralklang)

Z - Zentralklang (central sound)

Example 2.21.4



sound have an appropriate symbology invented for their use: it is thus absolutely essential that the performer(s) realize their parts before the concert (in fact Stockhausen requests that all realizations be communicated to Universal Edition[86]).

The actual process of selecting the symbols to fit with the various moments was done very strictly according to the Fibonacci series,[87]

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86 As far as the present writer can determine, this has only been accomplished on one occasion; this was that realization used for the first performance, a tape of which was sent to Universal Edition.

87 This series is named after the medieval Italian Mathematician, Leonardo Fibonacci (c. 1170 - c. 1250). Each term in the series is the sum of the two preceding terms. The series thus created represents, in the limit, the reciprocal of the golden section, $\frac{1+\sqrt{5}}{2}$, which may be graphically notated:

$$\frac{AB}{AC} = \frac{BC}{AB}$$

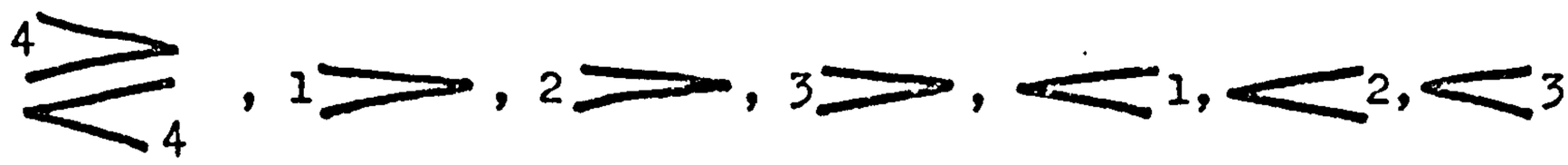
In the present day this series has been much used by artists such as Paul Klee and Salvador Dali, and by composers such as Bela Bartok.

a series which had been used in Zyklus to determine the number of attacks within a given time-unit in some of the periods.[88] This series starts as follows:-

$$1\ 1\ 2\ 3\ 5\ 8\ 13\ 21\ 34\ 55\ 89\ 144\ \ \frac{1}{\sqrt{5}}\left\{\left[\frac{1+\sqrt{5}}{2}\right]^n - \left[\frac{1-\sqrt{5}}{2}\right]^n\right\}$$

Although all the parameters and transformations in Plus-Minus are subject to this series, only a few will be illustrated to show their distribution.

First of all, the symbol used to convey the degree of transformation potential available:-



On page A,[89] the distribution of this symbol is as in the following table:-

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88 As will be seen further on in this chapter, Stockhausen makes great use of this series.

89 Since the pages are obviously not numbered, for the purposes of this discussion the pages have been assigned letters as follows:-

Letter	Page Heading
A	← entweder / either ——— oder / or →
B	⇄ 2 3 ⇄
C	→ ←
D	← →
E	
F	←
G	⇄ entweder / either ——— oder 2 / or ⇄

Page: A	
Symbol	Moments in which the symbol occurs / Total number of occurrences
4 4	1 3 6 8 10 13 15 18 21 24 26 29 31 33 35 37 41 43 48 51 53 — 21
1	2 4 7 9 14 16 23 25 36 38 45 50 52 — 13
2	5 11 17 22 27 34 39 49 — 8
3	12 20 28 40 47 — 5
1	19 32 46 — 3
2	30 42 — 2
3	44 — 1

Secondly, on page A, the occurrence of the Gestalt and secondary notes will be tabulated:-

Page A

Symbol	Moments in which the Symbol occurs	Total number of occurrences
AZ	5 8 10 12 42 45 47 51	8
A Z	2 4 6 13 15 21 27 33 39 41 48 50 52	13
ZA	1 3 7 9 11 14 17 19 22 24 26 29 31 34 36 38 43 44 46 49 53	21
AZA	28	1
$\overset{A}{Z}A$	23 32 53	3
$A\overset{A}{Z}$	25 30	2
$A\overset{A}{Z}A$	16 18 20 37 40	5
5 ⌐	1 7 9 14 16 20 22 25 27 30 32 35 37 39 41 43 45 47 49 51 53	21
4 ⌐	8	1
3 ⌐	6 13	2
2 ⌐	5 12 21	3
1 ⌐	2 15 17 24 31	5
6 ⌐	4 11 19 23 29 33 38 40 44 46 48 50 52	13
none	3 10 18 26 28 34 36 42	8
D^{90}	4 8 13 17 20 22 29 31 33 36 40 45 51	13
⌒....	26	1
⌒—	9 12 24 42 46	5
⌒	6 28 48	3
∿	3 52	2

90 for an explanation of this set of symbols see p. 29 in the score.

Page A, occurrence of Gestalt and secondary notes (Continued)

Symbol	Moments in which the symbol occurs	Total number of occurrences
K	1 5 7 11 14 16 19 21 23 25 27 30 32 34 37 39 41 43 47 49 50 53	21
none	2 10 15 18 35 38 44 49	8

If the distribution of the previous symbol is now continued on pages B to G, then the following tables result:-

Page B		
Symbol	Moments in which the Symbol occurs	Total number of occurrences
D	7 9	2
∧····	19 22 24 27 29	5
⌐—	2 5 8 11 13 16 18 21 23 25 28 30 32 35 37 40 42 45 47 50 52	21
∓	1 3 6 10 15 20 26 33 39 44 48 51 53	13
≈	31 34 36 38 41 43 46 49	8
K	12 14 17	3
none	4	1

Page C		
Symbol	Moments in which the Symbol occurs	Total Number of occurrences
D	5 11 17 22 27 34 39 49	8
∧.....	1 3 6 7 10 13 15 18 21 24 26 29 31 33 35 37 41 43 48 51 53	21
∧—	19 32 46	3
∓	30 42	2
∿	44	1
K	2 4 8 9 14 16 23 25 36 38 45 50 52	13
none	12 20 28 40 47	5

Page D		
D	5 12 21	3
∧—.....	3 10 18 26 28 34 36 42	8
∧—	8	1
∔	1 7 9 14 16 20 22 25 27 30 32 35 37 39 41 43 45 47 49 52 53	21
∿	2 11 19 23 29 33 38 40 44 46 48 50 51	13
K	4 15 17 24 31	5
none	6.13	2

Page E

Symbol	Moments in which the Symbol occurs	Total Number of Occurrences
D	1 3 7 9 11 14 17 19 22 24 26 29	
∧.·.·.·	31 34 36 38 43 44 46 49 53	21
∧.....	25 30	2
∧—	5 8 10 12 42 45 47 51	8
∤	16 18 20 37 40	5
∿	23 32 35	3
K	28	1
none	2 4 6 13 15 21 27 33 39 41 48 50 52	13

Page F

D	25 27 30 32 35	5
∧·.·.·	2 3 6 10 15 21 28 34 38 44 48 51 52	13
∧—	45 47	2
∤	50	1
∿	1 4 7 9 12 14 17 19 22 24 26 29 31 33 36 38 41 43 46 49 53	21
K	5 8 11 13 16 18 20 23	8
none	37 40 42	3

Page G.		
Symbol	Moments in which the Symbol occurs	Total Number of Occurrences
D	12	1
∧.....	8 29 46	3
∧—	2 14 16 18 20 22 24 32 34 38 40 42 52	13
∓	4 23 25 27 31 33 36 50	8
∿	6 26 28 30 48	5
K	10 44	2
none	1 3 5 7 9 11 13 15 17 19 21 35 37 39 41 43 45 47 49 51 53	21

Since the above analysis is rather lengthy, a chart showing the sum-distribution is given:-

Symbol	Page						
	A	B	C	D	E	F	G
D	13	2	8	3	21	5	1
∧.....	1	5	21	8	2	13	3
∧—	5	21	3	1	8	2	13
∓	3	13	2	21	5	1	8
∿	2	8	1	13	3	21	5
K	21	3	13	5	1	8	2
none	8	1	5	2	13	3	21

It thus follows that Plus-Minus is very rigorously constructed, comparable in control with the total serialism of a work such as Boulez' Structures.

2.22 Mikrophonie I nr. 15

(Microphony I)

Year of composition : 1964

Dedicated to : Alexander Schlee

Forces required : tam-tam, 2 microphones, 2 filters/ potentiometers

First performance : "Reconnaissance des musiques modernes", Brussels, 9th February, 1964

Duration : over 20 m.

Although Mixtur nr. 16 was composed before Mikrophonie I and II, it will be considered after them as it has undergone revision.

Mikrophonie I was written for performance upon the large tam-tam which Stockhausen had acquired for use in Momente.[91] The composition involves three main processes: the first of these is the excitation of the tam-tam by means of various materials; the second requires the use of directional microphones: for these the composer sets up scales of transformation of dynamic intensity and timbre (dependent upon the normal distance from the tam-tam the microphone is located), pitch, timbre and spatial location[92] (dependent upon the distance from the point of excitation the microphone is held and the way in which it is moved.) The third process again affects the timbre, pitch and rhythm, but is effected by

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91 160 cm. in diameter

92 Texte, Band III, p. 61

... vor allem des raümlichen Eindruck des Klanges ...

means of electronic controls: timbre and pitch are altered by regulating filter and gain, and rhythm by observing the composer's notation of change of pitch and timbre.

Hence there are three independent processes which are interrelated: as in Kontakte these may be taken in isolation or bound homophonically or polyphonically in up to six strata.[93]

The score contains 33 moments which are combined according to the composer's instructions to form a "Verknüpfungsschema"[94]. The method of performance etc. is considered by the composer,[95] and so will not be dealt with herein.

The notation in the score is completely graphical (Example 2.22.1): the upper half of each page is devoted to the first group of players and the lower half to the second group. Each group is further divided into three horizontal strata, one each for tam-tam player, microphonist and electronics. The upper stratum is split into three levels indicating the area on the tam-tam to be used: within these the dynamic intensity and mode of excitation are indicated by means of the thickness of the lines and dots. The timbre is indicated in words. The middle stratum (microphonist), is also split into three levels indicating the range from the microphone to the tam-tam's point of excitation, the thickness of the line indicates the distance from the tam-tam (thicker = nearer; thinner = further away). The lower stratum (electronics), is divided into two levels: the upper level indicates the frequency band which the filter is to pass, and the lower level the dynamic intensity thereof.

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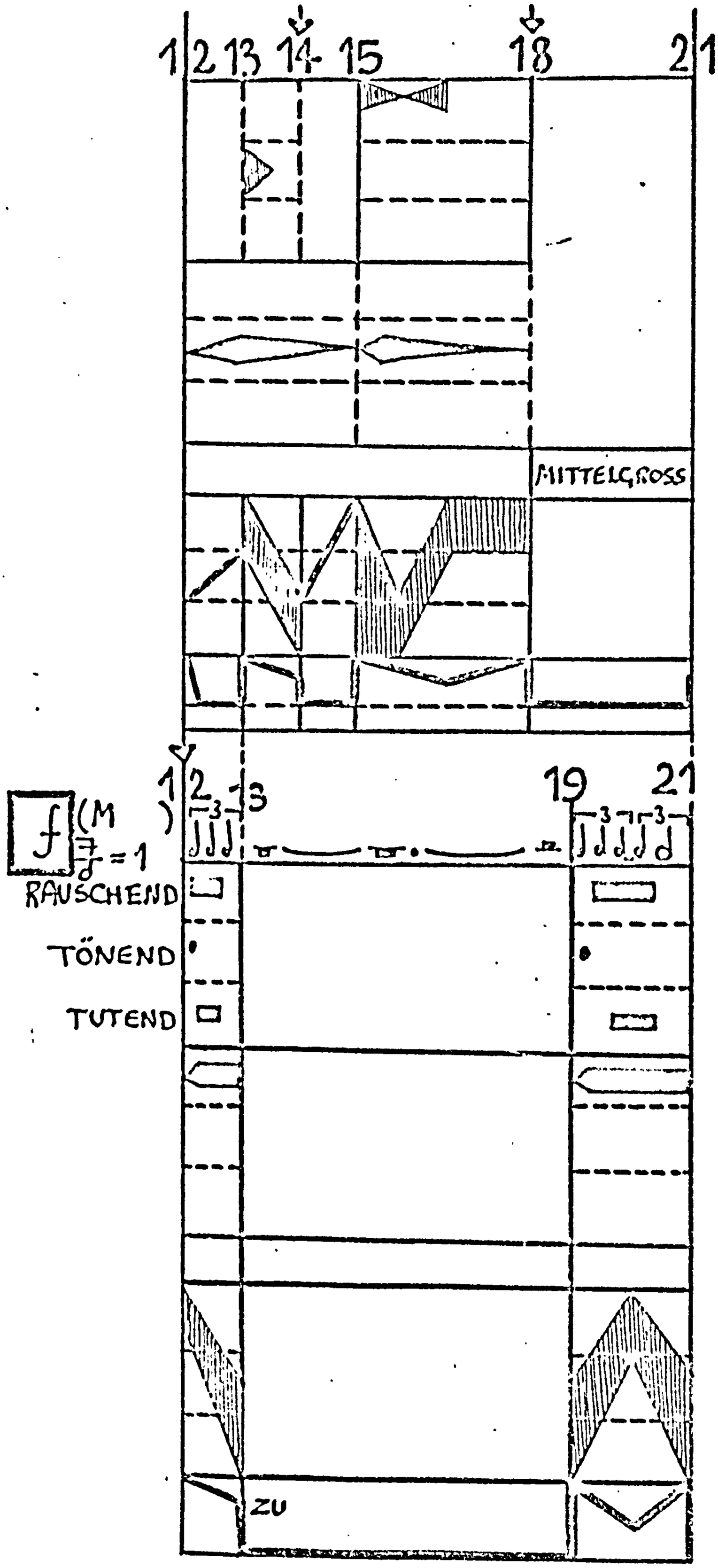
93 Texte, Band III, p. 61

94 "combination-scheme", for details of this see the score.

95 Texte, Band III, pps. 61 - 62

Example 2.22.1

(Mikrophonie I, section of moment at "Tutti 157")



Above the system devoted to the upper group of players the tempo is indicated, either metrically or with varying degrees of flexibility (Tempo flexibel, accel, rit, langsam aleatorisch).

From the above it may be seen that the length of the performance is indeed variable. For the first performance Stockhausen ordered the sequence of moments and directed the performance within a duration of 29m; in the W.D.R. version of 17th-18th December, 1965, Stockhausen established a version of Mikrophonie I lasting only 26.20s.

2.23 Mikrophonie II nr. 17

(Microphony II)

Year of composition	:	1965
Dedicated to	:	Judith Blinken
Forces required	:	choir (6 sopranos and 6 basses), Hammond Organ, 4 ring-modulators and tape-recorder
First performance	:	"Musik der Zeit", W.D.R. (Cologne) studios, 11th June, 1965
Duration	:	15m.

Mikrophonie II is one of the first of Stockhausen's compositions to employ the ring-modulator, the function of which will not be discussed herein as it has become one of the standard 'modifiers' in the contemporary avant-garde sound-spectrum.

"Im Mikrophonie II werden die verschiedensten Laute von Chorsängern mit Mikrophonen aufgenommen und zusammen mit den elektrisch-abgetasteten Töne einer Hammondorgel in besonders konstruierten Ringmodulatoren multiplikativ gemischt. Dadurch entsteht ein

geschlossener Kreis, eine sogenannte Rückkoppelung, bei der sich die Töne der Hammondorgel und die Chorklänge gegenseitig modulieren. Das Ergebnis wird zum Originalklang gleichzeitig über Lautsprecher wiedergegeben."[96]

As the composer mentions on the record-sleeve of this work (MS 7355), it is very easy for the ring-modulator to produce a wedge of fairly conformable sound: its use in Mikrophonie II is generally limited to simple combinations, many pitches of long durations and not-too-rapidly moving layers. As the composer writes on the same sleeve:-

> "I would never have composed as I did, had the 'what' (the material) of this process not had very specific characteristics which lead to a specific 'how' (the forming)"

Technically the sounds from the Hammond organ are fed into one of four ring-modulators, each connected to the microphone of one of the choirs:

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96 Texte, Band III, p.66

"In Mikrophonie II the different sounds of choral singers are picked up by microphones and mixed in multiplication with the electrically generated sounds of a Hammond Organ in a specially constructed ring-modulator. There thus comes about a closed circle, a 'feed-back', in which the sounds of the Hammond Organ and the choral sounds are modulated by each other. The result and the original sounds are played through the loudspeakers simultaneously."

the resulting signal is emitted, via a potentiometer controlling volume, through a loudspeaker. The resulting sound is an admixture of 'natural' voice and organ and 'synthetic' ring-modulated sonorities: the composer is relatively specific as regards the comparative volume of the 'synthetic' sound. The Hammond organ is also used to reproduce the singers' pitch, usually before it is heard (as, for example, the anticipatory B in M12 prior to the entry of Bass II in M13): the resulting sound should of course give the pitch an octave higher through the ring-modulator (the difference pitch of OHz is naturally ignored).

The text used in Mikrophonie II is taken from both Helmut Heissenbüttel's surrealist "Einfache grammatische Meditationen" (published in 1955 by Walter-Verlag, Olten und Freiburg, in Breslau) and also ordinary everyday speech: unlike previous works the composer does not set the individual phonemes as such, however Heissenbüttel's text does have a sort of Mallarméan meaning through its word-suggestion, repetition and regrouping that is, in the last analysis, virtually meaningless. The voices run through the whole gamut from song and speech to an almost Dada-infected exhibitionism.

As well as choir and Hammond organ sound-treatment there is a fifth, fainter, loudspeaker which emits extracts from the composer's previous works: the first occurrence of Stockhausen quoting from his own earlier output. These extracts are taken from the more sui generis passages of Carré, Gesang der Jünglinge and Momente (the specific occurences being shown in Example 2.23.1) and resemble further viewpoints (or windows) on the Mikrophonie II-continuum: the better known the four works are the more relevant the windows.

As has already been observed in Plus-Minus, Stockhausen was

very much taken with the Fibonacci series. Therefore it comes as no surprise to find its use in Mikrophonie II - as in the determination of the relative duration of the individual moments (Exanple 2.23.1). The number of occurrences of each of these durations is also almost linked to a member of the Fibonacci series: 144 occurs once, 89 twice, 55 thrice, 34 four times, 21 five times, 13 six times, 8 eight times, 5 and 3 twice each. There seems to be no such systematic sequencing of the pitches in this work.

Example 2.23.1

(Mikrophonie II, duration of moments and occurences of windows)

Moment	Duration (s)	Window used in moment
1	5	
2	3	Gesang der Jünglinge (i)
3	144	
4	34	Carré (ii)
5	89	
6	8	
7	8	
8	34	Momente (iii)
9	34	
10	21	
11	13	Gesang der Jünglinge (iv)
12	13	
13	8	
14	8	
15	21	
16	55	
17	8	Carré (v)
18	55	
19	21	Momente (vi)
20	55	Carré (vii) and Gesang der Jünglinge (viii)
21	13	
22	13	
23	21	
24	13	
25	13	
26	8	
27	8	
28	34	
29	89	
30	8	
31	21	
32	5	Momente (ix)
33	3	

Example 2.23.1
(continued)

Key to the sections from the various works found in Mikrophonie II:-

(i) Gesang der Jünglinge : from 1m 1.5s to 1m 11.5s

(ii) Carré : about figure 82x

(iii) Momente : M(m) p.2 from c. 1.5s ending on a pause

(iv) Gesang der Jünglinge : from 1m 10s to 1m 33.5s

(v) Carré : from figure 81 (beat 2) to the close of figure 81 (orchestra III solo)

(vi) Momente : c34s including KM(d) in Moment K(m)

(vii) Carré : c78s : figure 82x from J (after the pause) to the close of figure 82x synchronized with (viii)

(viii) Gesang der Jünglinge : from 1m 32s on track IV to 2m 42.5s, at the beginning of the pause

(ix) Momente : c13s in Moment KM

2.24 Mixtur nr. 16 and 16½

(Mixture)

nr. 16

Year of composition	:	1964
Dedicated	:	in memory of Serge and Natalie Koussevitzky
Forces required	:	5 ensembles of instruments,[97] 4 ring-modulators, signal-generator
First performance	:	das neue werk, N.D.R. (Hamburg), 9th November, 1965
Commissioned by	:	Koussevitzky Music Foundation
Duration	:	c. 28 m.

nr. 16½

Year of composition	:	1967
Dedicated to	:	The Ensemble "Hudba Dneska", Bratislava and their leader Ladislav Kupkovic
Forces required	:	5 ensembles of instruments,[98] 4 ring-modulators, signal-generator
First performance	:	Frankfurt, 23rd August, 1967
Duration	:	c. 28 m.

Within Mixtur there are basically two families of sonorities. The first, and simplest to explain, consists of three percussionists, each of whom plays a tam-tam and a cymbal (both instruments are suspended within a framework). To each of these instruments (or their supports) is attached a contact microphone. The two signals from one player's

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[97] for full details of instruments used see the score.

[98] for full details of instruments used see the score.

instruments are fed through amplification and out a loudspeaker. The second consists of the four groups: woodwind, brass, plucked strings and bowed strings. Each of these separate groups has its own set of microphones. The signals from a particular group's microphones are led through a mixer and thence to a ring-modulator: also entering the ring-modulator is a signal from a sine-wave generator. This mixture of instrumental and electronically-synthesized sound is passed through amplification and out a loudspeaker.

Hence by mixing electronic and instrumental sonorities the composer has succeeded in creating a range of timbre only previously possible in pure electronic music: it follows that these electronic modulations will also affect pitch, rhythm and duration.

Since the only difference between nr. 16 and nr. 16½ is the size of the ensemble, it will make no real difference which score is considered.

Within Mixtur there are twenty moments which may appear in several orders. The two basic moment-sequences are forward and retrograde, although Stockhausen does offer alternative changes, with various conditions attached.[99]

Each moment contains several sub-moments, using boxes to indicate various combinations of parameters. These boxes give a shape (Gestalt), which is modified by superimposing on it a confirmation (Struktur) within an electronically-defined envelope. In "Punkte",[100] (Example 2.24.1) there are three such boxes and one of these will serve as example. Therein the flute and oboe play three short notes from their selection with dynamic intensities chosen from those given, then the bass clarinet and bassoon do the same; the final event is a combination of the two preceding ones.

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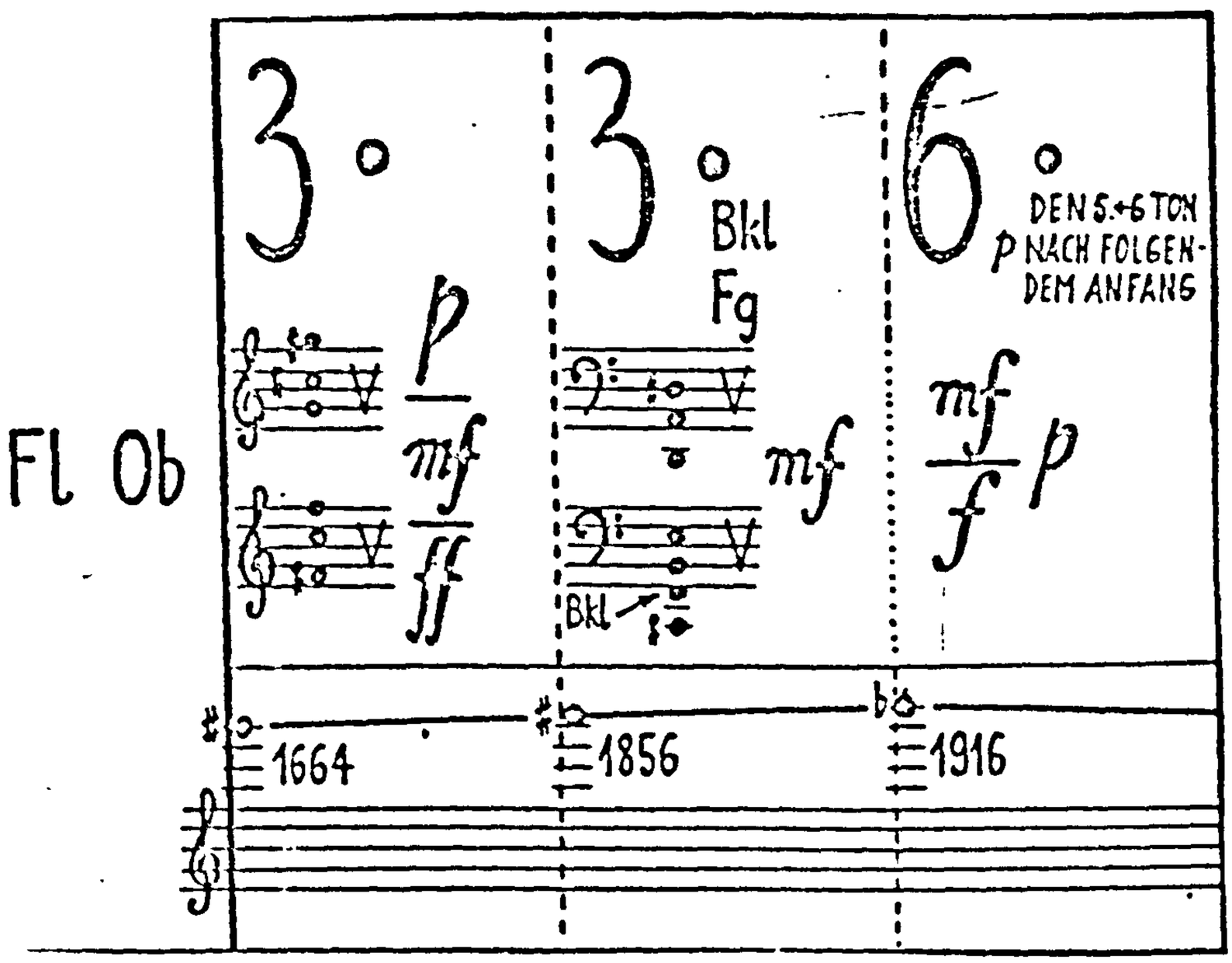
[99] see the introduction to the score, p. 7.

[100] from nr. 16½

Example 2.24.1

(Mixtur, extract from "Punkte")



Within Mixtur may be found ideas formulated much earlier, such as the point-fields in the string parts on the second page of "Richtung", (Example 2.24.2).

2.25 Stop nr. 18 and 18½

Year of composition	:	1965
Forces required	:	orchestra (divided into six groups)[101]
First performance	:	musique vivante, Paris, 2nd June, 1969
Duration	:	c. 15 m.

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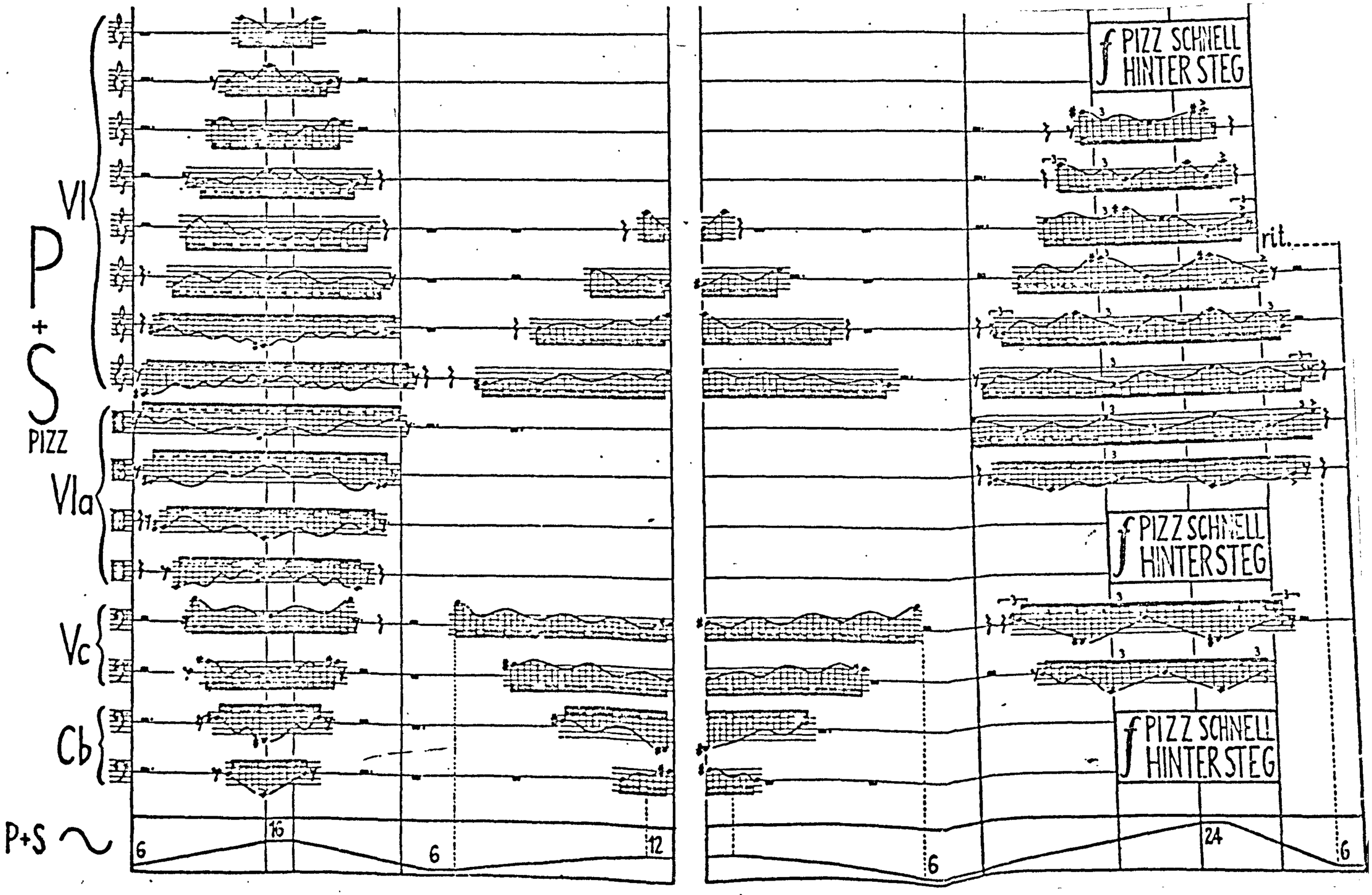
[101] for method used see the score.

Example 2.24.2

(Mixtur, extract from "Richtung")



The 1969 version of Stop (nr. 18½) is merely that version of the composition which Stockhausen established for the first performance; this was dedicated to Diego Masson[102] and lasted 15m.

Stop was composed during the "Kurse für Neue Musik", held in Cologne during 1964 - 65, at the request of members of his composition class who wanted to know the processes Stockhausen adopted, at that time, in writing music.

The director is first of all to divide the orchestra into "sechs charakteristische, gemischte Instrumnentalgruppen ⟨I⟩ - ⟨VI⟩ "[103], taking into account the pitches prescribed for each of the 42 moments, (Example 2.25.1). For both the Paris (1969) and London (1973) versions Stockhausen specified certain divisions of the ensembles (Examples 2.25.2 and 2.25.3).

Example 2.25.2

(Stop, orchestral division in the "Paris" version)

Group I

Oboe; Piano; Tuba

Group II

Electronium; Trumpet; 2nd Violoncello

Group III

Vibraphone; Bass Clarinet; 1st Violoncello

Group IV

Basset Horn; 2nd Viola; Bassoon

Group V

Clarinet in E♭,A; Violin; Tenor/Bass Trombone

Group VI

Flute; Alto Flute; 1st Viola; Horn

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102 then director of "Ensemble Musique Vivante"

103 six characteristic, mixed groups (see score)

Example 2.25.3

(Stop, orchestral division in the "London" version - played originally by "The London Sinfonietta")

Group I

Oboe; Piano; Electric Organ

Group II

Electronium; Trumpet; 2nd Violoncello

Group III

Vibraphone / Tam-tam; Bass Clarinet; 1st Violoncello (electric)

Group IV

Synthesizer (VCS3); English Horn; Bassoon

Group V

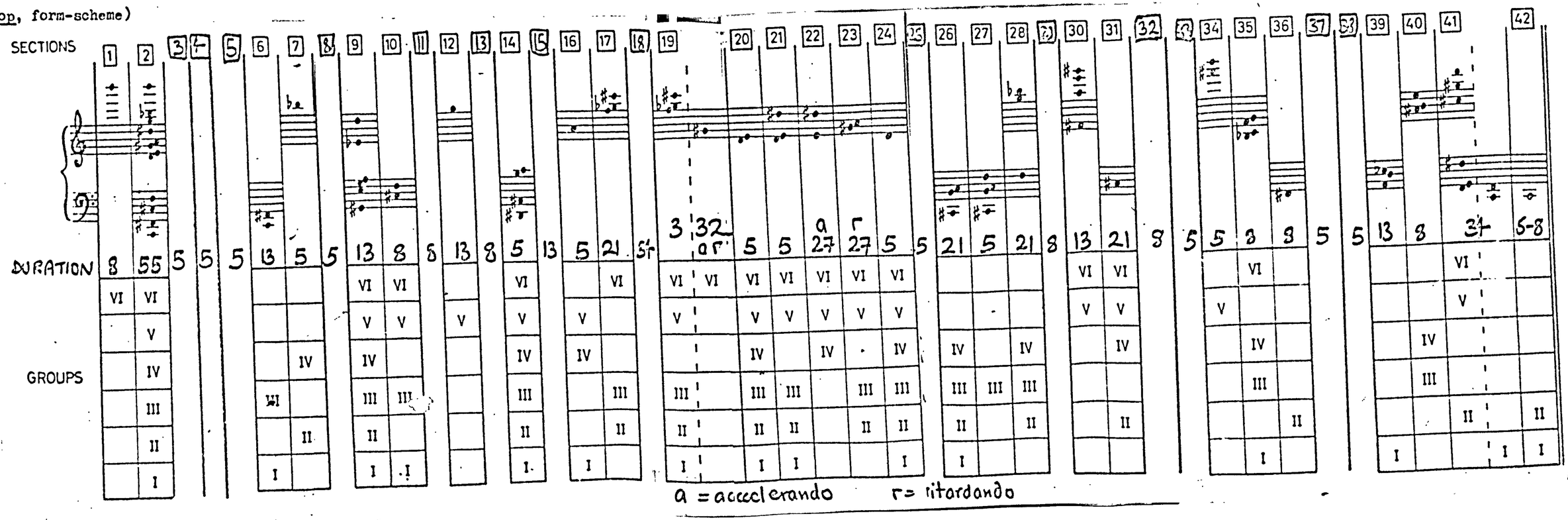
Clarinet; Violin; Trombone; Harp

Group VI

Flute; Horn; Electric Bassoon / Alto Saxophone / Synthesizer

Example 2.25.1

(Stop, form-scheme)



Within the score are to be found precise directions regarding the interpretation of the notation used. The innovation within Stop is the technique of moving from moment to moment. Stockhausen indicates five transitions, four of which take a time selected by the director, in the following manner:-

(1) | Change immediately

(2)
Stop the groups successively with separate indications: each indication is also the signal for a new group to start: the groups may be divided into sub-groups so that relative numbers of players may be stopped/started.

(3)
Instruments stop $\frac{\text{and}}{\text{or}}$ start of their own volition.

(4)
Each instrument is stopped individually, groups are started in a sequence with the stops or separate from them.

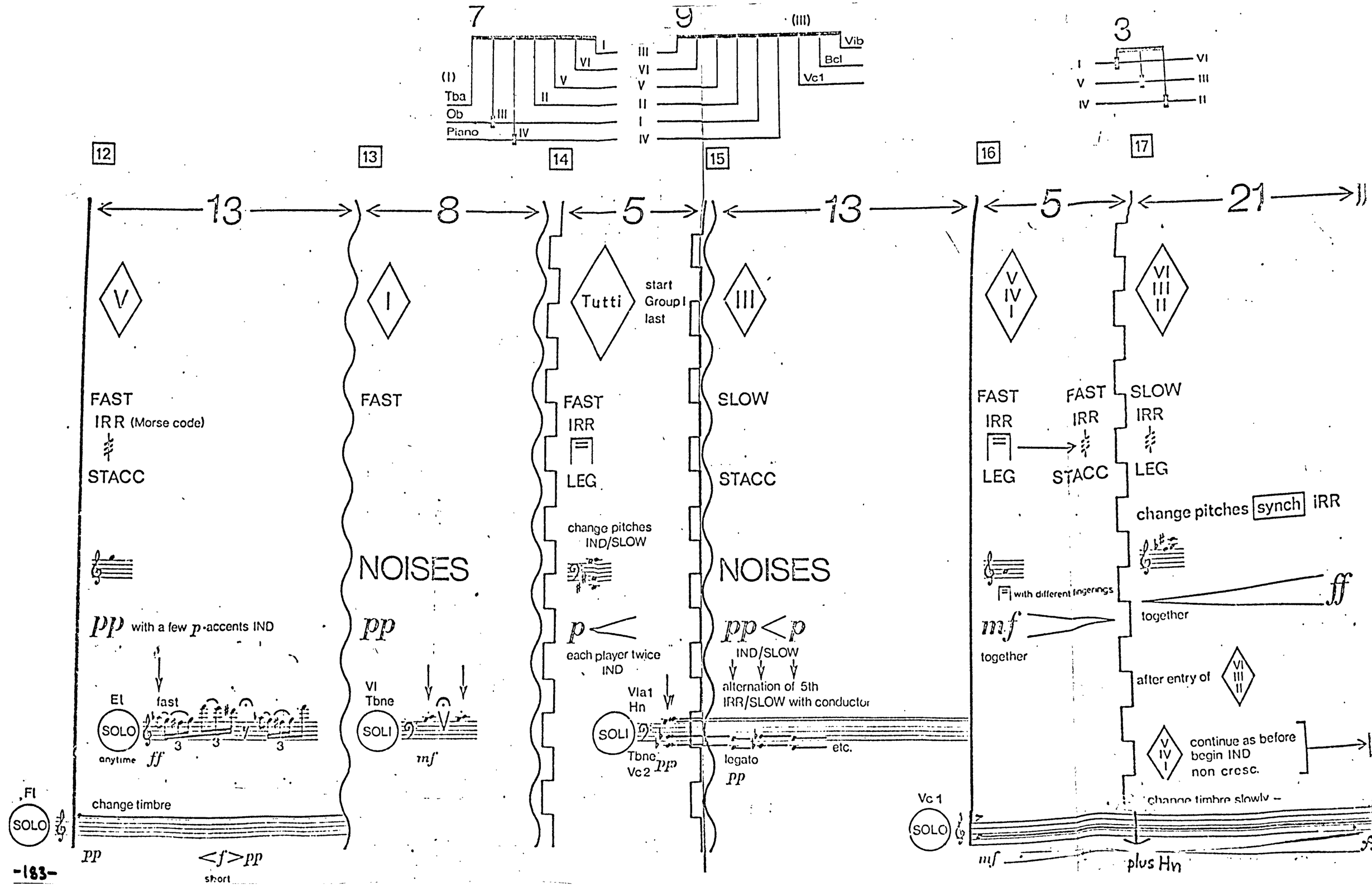
(5)
Stop one group after another, instruments start individually either with the stops or separately.

Examples of these and their realizations may be found in the "Paris" version. Transitions (3), (4), (5), (1) and (2) are to be found together between moments 12 and 17 (Example 2.25.4): the diagrams above the "stops" indicate the sequence of events in that transition.

Again the Fibonacci series is used to determine the relative duration of the individual moments (Example 2.25.1). The pitches consist of five weighted aggregates spread over the whole duration (M1 - M7; M9 - M14; M16 - M27/28; M28 - M36/M39 and M39 - M42).

Example 2.25.4

(Stop, /"Paris" version/, Moments 12 - 17)



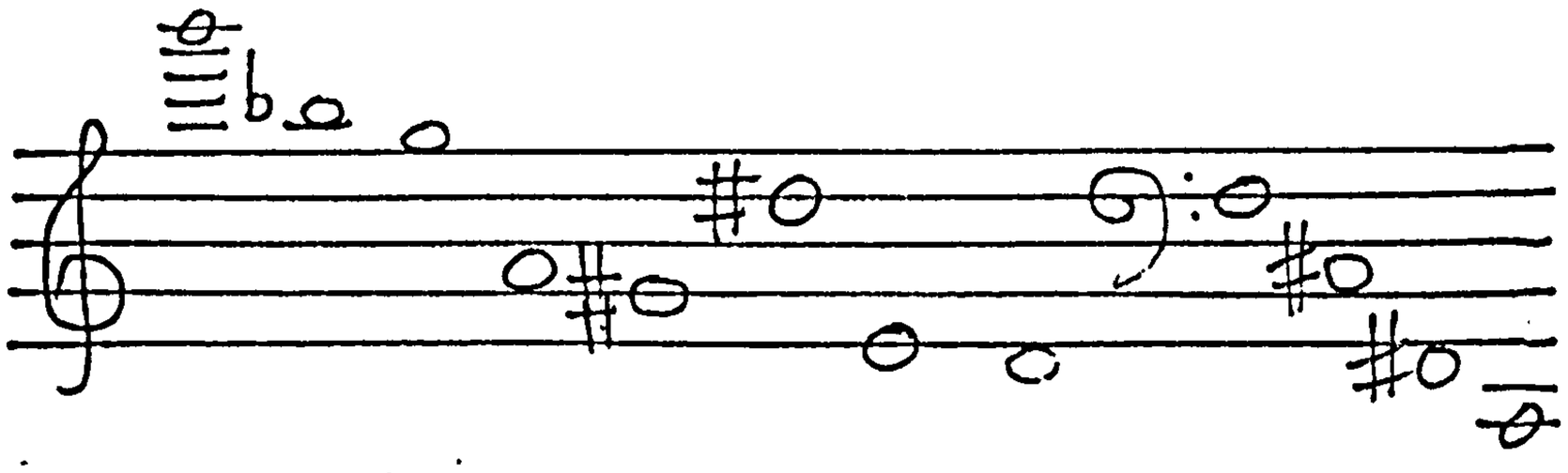
With Stop the organic sound process is continually stopped by 'silences' which carry with them traces of previous sonorities. Onto this is increasingly imposed specified patterns, notes and signals which, as the end approaches, become more and more melodious (as may be seen in M39 and M41 - the latter indeed having a 'tune' in the key of A major).

Throughout the passage of Stop twelve prolonged pitches descend from above (Example 2.25.5), with the exception of the D♯ which represents a momentary ascent. These occur in the following moments:-

Pitch	Moments
B	1 - 2
B♭	2, 7
G	4, 11, 12
A	16 - 18
G♯	19
D♯	21, 22
E	22
D	24 - 25
F	27 - 28
C♯	31 - 33
F♯	35 - 38
C	41 - 42

Example 2.25.5

(Stop - the twelve 'descending' pitches)



All twelve pitches are presented 'vertically' in M2:indeed, with the exception of the A in the solo of M7 all the pitches thus far belong to the set as in Example 2.25.5.

2.26 Solo nr. 19

Year of composition : 1965 - 1966

Dedicated to : Alfred Schlee

Forces required : one instrumentalist, tape-recorder and electronics and four assistants

First performed : N.H.K. (Tokyo), 25th May, 1965 (Flute and Bassoon)

Commissioned by : N.H.K.(Tokyo)

Duration : c. 6m to c. 10m

Since both the composer and Harvey have provided a detailed discourse on the performance of Solo and its construction, the present writer does not intend discussing this work.[104]

2.27 Telemusik nr. 20

(Telemusic)

Year of composition : 1966

Dedicated to : the Japanese people

Forces required : electronic music (5-track tape[105])

First performed : N.H.K.(Tokyo), April, 1966

Duration : 17m 30s

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[104] (a) Texte, Band III, pps 85 - 87

(b) 'Introduction to the score: with Stockhausen's later process-orientated works the actual method of composition is usually described in the introduction to the score since this is the easiest way of explaining the mode of performance.

(c) The Music of Stockhausen - an Introduction pps, 97 - 99

[105] realized in the electronic studios of N.H.K. (Tokyo), and only playable on their machine.

"In der Telemusik waren es die Bruchstücke aus der namenlosen Folklore vieler Länder und Völkerstämme: aus Afrika, vom Amazonas, aus Japan, Ungarn, China, Spanien, Vietnam, Bali: moduliert, transformiert, harmonisiert, einbezogen in die Welt neu entdeckter Elektronischer Musik; vereinigt ohne Nivellierung und gegenseitige Zerstörung."[106]

Although basically a process composition, containing 32 moments, Telemusik is one of the first of Stockhausen's pieces to use the idea of meta-collage.[107] Meta-collage rather than collage since the procedure is to intermodulate seemingly mutually exclusive phenomena to create a supra-ordered unity within which the individual differences may occur. These phenomena are as varied as the Balinese gamelan, a Spanish village festival or oriental temple instruments.[108] This system of meta-collage is illustrated by Stockhausen:[109] moments may occur in which the song of a Shipibo mother is modulated with the rhythm of a sevilliano, which is in turn modulated with timbre and harmonies derived by the composer,

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106 Texte, Band III, p. 114

"In Telemusik are* fragments of the common folk-heritage of many lands and races: from Africa, the Amazon, Japan, Hungary, China, Spain, Vietnam and Bali: modulated, transformed, harmonized and absorbed into the new-found world of electronic music; totally integrated so that there should be no loss of identity or reduction to the mean."

* literally "they were".

107 Chapter 1.10

108 Texte, Band III, pps. 75 and 79

109 as, for instance, in moment 13.

all of which are now modulated with the dynamic intensity envelope of a priest's song from the Todaiji Temple, Nara.[110]

Since the composer has written on Telemusik in Texte,[111] the present writer does not intend discussing the work any further.

2.28 Adieu (für Wolfgang Sebastian Mayer) nr. 21

Year of composition : 1966

Dedicated to : the memory of Wolfgang Sebastian Mayer

Forces required : Wind Quintet (Flute, Oboe, Clarinet, Horn, Bassoon)

First performed : Calcutta, 30th January, 1967

Adieu was written in memory of Wolfgang Sebastian Mayer, the organist son of the Cologne oboist Wilhelm Mayer for whom Stockhausen had written Zeitmasse. Wolfgang Sebastian Mayer was killed in a road accident whilst driving from Rome to Como on 10th January, 1966 at the age of 27.[112] Stockhausen took two days to compose the work.

Adieu contains 31 moments, the duration of each being a number drawn from the Fibonacci series (Example 2.28.1). The structure falls into eight moment-groups divided up by either a pause or a short insert in a set tempo; these eight moment-groups further combine to form four super-moment-groups of equal duration (Example 2.28.1). The five inserts each imply a cadential progression which resolves onto a chord which forms the basis of the ensuing moment-group. The pitches of the moments form a sequence of fourteen loosely associated weighted aggregates.

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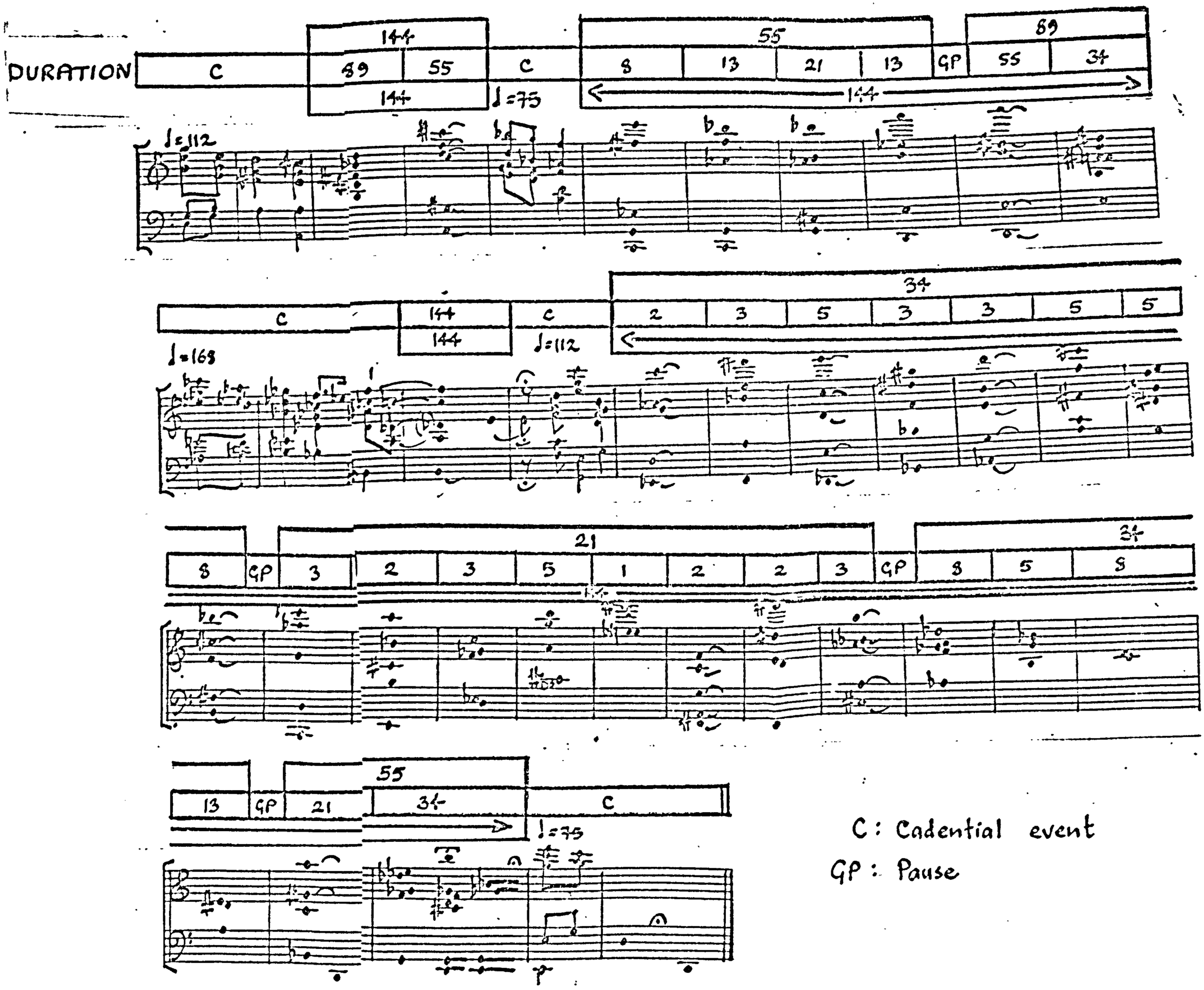
110 Stockhausen: Life and Work - Karl H. Wörner, p. 143.

111 Texte, Band III, pps. 75 - 78, 79 - 84.

112 The age of Wolfgang Sebastian Mayer is at question: Texte, Band III, p. 92 gives the age of death as 29, whereas the score says 27.

Example 2.28.1

(Adieu, structure)



2.29 Hymnen nr. 22, 22½ and 22⅔

(Anthems)

nr. 22

Year of composition : 1966 - 67

Dedicated to : 1. Pierre Boulez
2. Henri Pousseur
3. John Cage
4. Luciano Berio

Forces required : electronic and concrete (4-track tape)

First performed : Apostel-Gymnasium W.D.R. (Cologne), 30th November, 1967

Commissioned by : W.D.R. (Cologne)

Duration : 114 m.

nr. 22½

Year of composition : 1966 - 67

Dedicated to : Fred Ailings, Rolf Gehlhaar, Johannes Fritsch, Harald Bojé and Aloys Kontarsky

Forces required : nr. 22 + soloists[113]

First performed : Apostel-Gymnasium, W.D.R. (Cologne), 30th November, 1967

Commissioned by : W.D.R. (Cologne)

Duration : c. 125 m.

nr. 22⅔[114]

Year of composition : 1969

Forces required : nr. 22 + orchestra[115]

Duration : 38 m.

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113 see score for instrumentation

114 full title: Dritte Region der "Hymnen"

115 see score for instrumentation

The four-track tape of Hymnen is one of a gigantic collage compiled of approximately forty anthems and identities from all over the world.[116] Although the ordering of the regions and their durations is very flexible, Stockhausen must have had dramatic reasons for the particular sequence he adopted.

The opening region has two main centres (as the composer names the subsections of the work): the "Internationale" and the "Marseillaise" which are gradually evolved from a grand collage of short-wave transmissions.

From the 'reading'-score it is possible to trace the evolution of the various anthems with some degree of certainty. The first region lasts for 27m 38s. It starts with a proemial passage which lasts for 6m 04.5s in which the "Internationale" is to be heard emerging from a background of short-wave carriers and signals: the various durations, tempi and pitches do not seem to belong to any systematic pattern of construction. The metrical patterns are all derived from the various anthems (for instance, after 2m 52.5s the German anthem may be heard at ♩= 70, in D major). In such an international work, it is interesting to note the use of the anthem of the United Nations (6m 51s, ♩= 120, B♭ major). Throughout this prelusory section there are two other features of interest. The first is the croupier saying "Faites vôtre jeux, messieurs dames, s'il vous plaît" (4m 33.5s) - a feature which occurs periodically throughout this region. The second is the occurrence of five 'cadences' after 1m 15s, 2m 16s, 3m 30s, 4m 50s and 5m 56.5s (Example 2.29.1).

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116 As primary source Stockhausen used National Anthems of the World, edited by Martin Shaw.

Example 2.29.1

(Hymnen - five 'cadences' in Region I)

Then follows the first centre based on the "Internationale" (lasting from 6m 04.5s to 17m 41.8s). As its name suggests this section is virtually all based on the "Internationale" - starting at the beginning of the centre with the anthem in B♭ major (♩=112) moving to F♯ major after about 17s. A further two cadences occur after 6m 51s and 8m 05.5s respectively (Example 2.29.2). The croupier says "Neuf - the nine"

Example 2.29.2

(Hymnen, two cadences in Region I)

(7m 50.5s), "Impair et manque" (11m 54.5s) and "Messieurs, Dames rien ne va plus" (16m 09s): each of which has followed the other after an interval of some three to four minutes (the croupier is not heard again until the conclusion of Region IV). The extra-musical implications of the "Internationale" are to be found in the concentration for a period of 2m 17.5s on the connotations of 'red': the croupier (in French) leads off on a B♭ (9m 31.5s) with "Rouge...", Stockhausen (in French) follows on a B (9m 46.5s) with 'Rouge...", then Johnson (in English) on C (9m 51.5s) with "Bright red...", followed by Maiguashka (in Spanish) on B (9m 57.5s) with "Ro jo...", finally the composer again (in German) on B♭ (10m 01s) with "Rot...". Phrases such as "Winsor and Newton's artist's water colours" may be clearly heard.

The next section is a prelude to the second centre (17m 41.8s to 21m 07s) and is heralded by an ascending wash of sound (17m 48s) following

a crescendo across the "Internationale". Throughout this section the "Marseillaise" is progressively making its prescence felt. High flute-like sounds hovering around high E (six leger lines and a space above the treble clef) are heard - a sound predominating in centre 2. The German anthem occurs again (c18m 25s) as do various glassandi clusters.

The second centre (21m 07s to 22m 36.7s) is rather short - a mere 89.7s. It is based on the "Marseillaise", fragments of which are first heard in B major (at ♩=120), closely followed by excerpts from the anthems of the U.K. (in F# major, ♩=56), France (in B major, ♩=126), Belgium (in B major, ♩=104), France (in B major, ♩=126), Germany (in a distorted Eb major, ♩= 84), Italy (c.21m 38s), Luxembourg (c21m 43s), Netherlands (21m 53s), Spain (c22m 08s), the U.S.A. (c22m 16s) and the U.S.S.R.(c22m 23s): an extremely concentrated section of the work.

This is followed by a postlude to the second centre (22m 36.7s to 26m 44.5s) in which thick wedge-like clusters and chords progress either by discreet intervals or glissandi: loud brass-like chords which become increasingly amorphous as the link passage to Region II is reached, are interspersed with light filigree in the upper register of the sound-spectrum. The "Marseillaise" is to be heard right up to the link (at c26m 41s the anthem is heard in C major with a cluster accompaniment in the bass, at ♩=144).

The final section of Region I is the link to the second Region (26m 44.5s to 27m 28s, = 0m 00s for RegionII). After two fff cluster interjections (26m 44.5s and 26m 48.5s) the link is typified by a high held A #(1865Hz) moving to C (2093Hz) (26m 50.5s) and thence to B (3951Hz) (27m 16s): this B drops a major third to G at the beginning of Region II.[117]

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[117] this transition is further discussed on page 33

Having discussed the first region in some detail a brief summary of the ensuing three regions will be presented.

The second region has four centres: firstly the German anthem, then a recorded conversation in the studio which begins "Otto Tomek sagte ...", thirdly African anthems and lastly the anthem of the Soviet Union.

The third region has three centres. The first is an extremely slow unmodulated section based on the anthem of the Soviet Union.[118] This is followed by "The Star-spangled Banner" from the U.S.A.(and other American songs such as "John Brown's Body"). The last centre is devoted to a cheerful and colourful exposition of the Spanish anthem, interrupted three times towards the end by the Swiss anthem.

The fourth region has two centres. The first is that of the Swiss anthem (introduced by three colourful statements reminiscent of the conclusion of region three). The second, born of a fragment of the Swiss anthem, is that envisaged by the composer as belonging tc a Utopian country called "Hymunion in Harmondie unter Pluramon".[119] This is followed by breathing and seven 'insertions' or evocations of earlier material. Towards the conclusion there are two signatures by the composer who says "Pluramon" (similar to Dufay's self-identification in the Rondeau "Ce moys de may ").

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118 The anthem of the U.S.S.R. has here been created by purely electronic means, and is further discussed on page 34.

119 literally "Union of anthems in the harmony of the worlds in which all are one".

According to the composer,[120] Hymnen may be performed in a variety of locations and for a variety of purposes.

As well as these 40 anthems, Stockhausen also makes use of other insertions such as shop-noises, launching of a ship or other public events. These are intermodulated with the anthems, as well as also occurring "straight", so that a fresh insight is gained of the contents: the concept of a universal humanity inherent in the fourth region is represented by this transformation and integration of material - none, save the last anthem, being written by Stockhausen since only tape/disc recordings would fulfil the philosophical implications of the composition. This inter-modulation of material in a fashion similar to that used in Telemusik has been likened by the composer to that process used by Berg, Stravinsky or Varèse in their "collage" works:[121] the use of the chorale "Es ist genug" in Berg's Violin Concerto or the treatment of Chaikovsky's material in Stravinsky's "Le Baiser de la fée".

In Chapter One[122] the noumenon of a dualistic universe was considered in relation to the set. In Hymnen may be seen the corradiation of the automonous concept of an abstract, almost self-indulgent, world with that of the ideality of the real world to form a supra-ordered unity in the closing minutes of the last region.

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120 Texte, Band III, p. 97

The composer's notes on Hymnen will be found on pps. 96 - 98.

121 op. cit. p. 224.

122 Chapter 1.1

2.30 Prozession nr. 23

(Procession)

Year of composition	:	1967
Dedicated to	:	Fred Ailings, Rolf Gehlhaar, Johannes Fritsch, Harald Bojé and Aloys Kontarsky
Forces required	:	tam-tam, viola, electronium, piano, 2 microphones, 2 filters/potentiometers (6 players in all)
First performed	:	Radio Helsinki, 21st October, 1967
Duration	:	minimum 23 m.

This polymorphic composition is written within a musical process comparable with those already adopted in Plus-Minus, Mikrophonie I and Mikrophonie II, and consists, fundamentally, of an interpretation, in a way similar to that applied in Gesang der Jünglinge, Momente, Hymnen, Telemusik and, to a lesser extent, Adieu, of familiar music in a new way.

Since the composer has already provided excellent notes on Prozession,[123] the present writer feels it unnecessary to expound any further on this work, save to emphasize, two relatively new concepts: the duration of the work now has an established minimum (although this was seen as early as Zyklus, it was not until the composition of Mikrophonie I that it first started to appear: Plus-Minus, of course, had no time prescribed), and the instrumentation is changeable.

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123 Texte, Band III, pps. 102 - 107

2.31 Kurzwellen[124] nr. 25

(Short-waves)

Year of composition	:	1968
Dedicated to	:	Professor Hugo Wolfram Schmidt
Forces required	:	six players
First performed	:	Pro musica nova, Bremen, 5th October, 1968
Commissioned by	:	Radio Bremen
Duration	:	c. 50 m.

Although Stimmung follows Prozession chronologically, the author feels that the great affinities between Prozession and Kurzwellen merit a change in the order of consideration.

Kurzwellen, like Prozession, was originally conceived to be played by Stockhausen's ensemble,[125] but may have instruments substituted at the director's discretion.

As the composer writes,[126] and as has been demonstrated in this chapter, insertions, or sign-posts, have played an increasingly more important role in the progressive evolution of Stockhausen's music. It will come as no surprise, therefore, to find that in Kurzwellen these "gefundenen Klangobjekte"[127] are the random signals picked up by short-wave receivers, operated by the instrumentalists to which they must react according to a sequence of events indicated within their parts.[128] Hence,

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124 Kurzwellen mit Beethoven will be considered in Appendix One

125 Fred Ailings, Rolf Gehlhaar, Johannes Fritsch, Harald Boje, and Aloys Kontarsky

126 Texte, Band III, pps. 114 - 115

127 "found sound-objects"

128 see Stockhausen's explanation of events in the score.

the culmination of Stockhausen's output represents the opening of a new door in the realm of consciousness which was to be further explored in such works as Stimmung and Aus den sieben Tagen.

2.32 Stimmung nr. 24

(Tuning)

Year of composition : 1968

Dedicated to : Mary Baumeister

Forces required : "Sex-tête" - six vocalists and sound projection

First performed : Paris, 9th December, 1968

Commissioned by : Collegium Musicale (Cologne)

Duration : c. 73 m.

Another of the best-known (most heard?) works of Stockhausen, Stimmung is part of the composer's exploration of a new consciousness by meditative and intuitive processes. As with all his compositions from Plus-Minus to Stimmung, Stockhausen has provided very adequate notes on this work:[129] all that remains that could be given is the sort of subjective account of a performance which is not within the tenets of this thesis.

2.33 Aus den sieben Tagen nr. 26

(From the seven days)

Year of composition : May, 1968

Since this work consists of fifteen texts, the forces required, first performances and durations are obviously not all the same, therefore this information will be listed separately (Example 2.33.1).

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129 Texte, Band III, pps. 108 - 111

Example 2.33.1

Table of contents of Aus den sieben Tagen

Nr.	Text	Date of composition	Resources	First performed
1	Richtige Dauern (Right durations)	7th May	4 players	26th August, 1969 Darmstadt Summer School
2	Unbegrenzt (Unlimited)	8th May	Ensemble	26th July, 1969 St. Paul de Vence
3	Verbindung (Connection)	8th May	Ensemble	7th June, 1969, Paris
4	Treffpunkt (Meeting Point)	8th May	Ensemble	27th August, 1969 Darmstadt Summer School
5	Nachtmusik (Night Music)	8th May	Ensemble	31st August, 1969 Darmstadt Summer School
6	Abwärts (Downwards)	8th May	Ensemble	28th August, 1969 Darmstadt Summer School
7	Aufwärts (Upwards)	8th May	Ensemble	29th August, 1969 Darmstadt Summer School
8	Oben und Unten (High and low)	9th May	Theatre-piece, 3 actors and 4 players	10th June, 1969 Amsterdam
9	Intensität (Intensity)	9th May	Ensemble	29th August, 1969 Darmstadt Summer School
10	Setz die Segel zur Sonne (Set sail for the Sun)	9th May	Ensemble	30th May, 1969 Paris
11	Kommunion (Communion	9th May	3 to 7 players	27th August, 1969 Darmstadt Summer School
12	Litanei (Litany)	10th May	Addressed to the player	15th November, 1969[130]

130 Read by Gisela Kontarsky during a recital in the "Beethovenhalle", Bonn.

Example 2.33.1 (Continued)

Table of contents of Aus den sieben Tagen

Nr.	Text	Date of composition	Resources	First performed
13	Es (It)	10th May	Ensemble	26th August, 1969 Darmstadt Summer School
14	Goldstaub (Gold Dust)	10th May	Small Ensemble	20th August, 1972 Stockhausen's home for the purposes of a gramophone recording
15	Ankunft (Arrival)	11th May	For any number of musicians	15th November, 1969[130]

Aus den sieben Tagen is perhaps the culmination in the field of intuitive music by Stockhausen.[131] Kurzwellen, the previous composition, represents a communication between Stockhausen and the listener/performer through the medium of short-wave transmissions. With Aus den sieben Tagen the communication is now via "die Schwingungen ... aus einem höheren".[132] The participants are asked not to think - just to react intuitively.

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130 Read by Gisela Kontarsky during a recital in the "Beethovenhalle", Bonn.

131 Excluding such works as Ylem etc. for which scores are not available.

132 "vibrations from above" (Litanei).

2.34 Spiral nr. 27

Spiral was composed during 1968 and is written for any soloist with short-wave receiver. It was first performed at the Muzicki Biennale Zagreb during May, 1969, and lasts for c 15m.

Spiral[133] a further process-score in the style of Kurzwellen, originated as a guitar composition for the American Michael Lorimer. After a few weeks Stockhausen lost enthusiasm for this project and reconceived his ideas as Spiral. In its first performance it was played on the oboe by Heinz Holliger and the first recording was made by Michael Vetter using an electric recorder: at the Osaka "Expo 70" Spiral received very many performances.[134]

2.35 Fresco nr. 28 (Wandklänge zur Meditation)

(Wall-sounds for meditation)

Fresco was composed in 1969 for four orchestral groups playing in four separate locations at approximately the same time in order that the public might wander from room to room searching for those sounds which attract them. It was first performed in the newly-opened Beethovenhalle, Bonn, on 15th November, 1969, each orchestra playing for roughly 40m.

2.36 Tunnel-Spiral nr. 27½

Tunnel-Spiral was written during 1969 at the request of John Mizelle, Composer and Technician at the "Los Angeles Municipal Arts Departments Junior Arts Center" for performance in their sound tunnel.[135]

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133 For Stockhausen's notes on Spiral see Texte, Band III, pps. 135 - 141

134 ibid. p. 140

135 ibid. pps. 188 - 193

It was first performed in November, 1970 and is dedicated to Mizelle.

2.37 Opus 1970 nr. 29

Opus 1970 was written at the request of the organizers of the "Beethoven Bicentenary" celebrations. Composed in 1969, Opus 1970 is based on the score of Kurzwellen, indeed it has been variously titled Kurzwellen mit Beethoven and Stockhoven-Beethausen. Instead of supplying the players with short-wave receivers, Stockhausen manufactured four tapes of Kurzwellen-like excerpts from Beethoven's compositions and gave these to the performers. Opus 1970 was first played in Düsseldorf on 17th December, 1969.

2.38 Pole für 2 nr. 30

Pole was composed between 1969 and 1970 for two players and electronic modification. It is based on Spiral, thus using the same notation as that originated in Kurzwellen and Prozession. The first of many performances took place on 20th March, 1970 at the World Fair, Osaka. As with Spiral and Expo, the duration of Pole is about 15m. It was originally entitled 'Duo'.

2.39 Expo für 3 nr. 31

Composed at the same time as Pole, Expo is written for three players and electronic modification. It, too, was premiered at the World Fair, Osaka, although on the following day, 21st March, 1970. 'Trio' was the original title of this work.

2.40 Mantra nr. 32

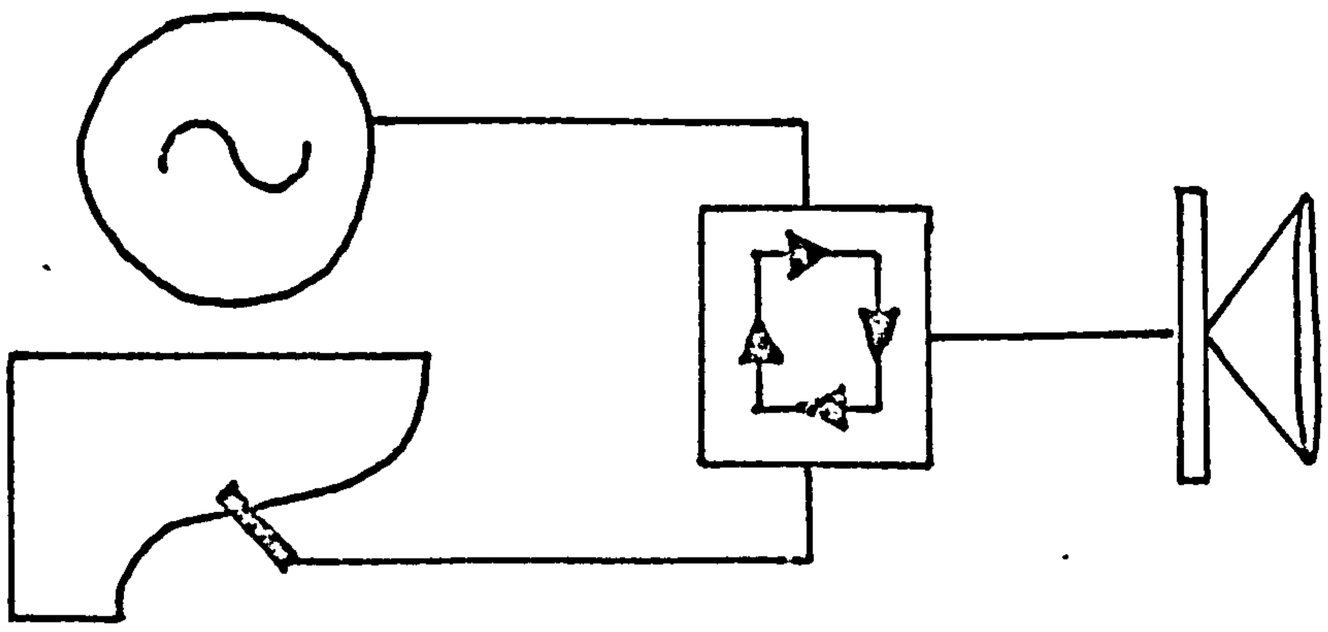
Year of composition	:	June - August 1970
Forces required	:	2 pianists, each also playing crôtales, wood-blocks and operating sine-wave generators. Sounds then ring-modulated and directed through two loudspeakers
First performance	:	Donaueschingen, 18th October, 1970
Commissioned by	:	S.W.D.R.
Duration	:	c. 60 m.

Mantra represents a return to a completely notated complex score: a device not used by Stockhausen since the early nineteen-sixties. On the surface it represents a negation of the collective ideal of such later works as Aus den sieben Tagen or Pole: a reversion to artistic individuality and personal involvement.

Before discussing the content of Mantra it is first of all necessary to mention the method of sound production. The sonorities produced by a piano and its conjugate sine-wave generator are ring-modulated and fed out through a loudspeaker (Example 2.40.1). This means that for all pitches on the piano there will be two other pitches produced through the loudspeaker (save only when the pitch on the piano and that on the sine-wave generator are the same - at that point one of

Example 2.40.1

(Mantra, Sound production) one piano only shown as both use identical means.



the resultant pitches will be 0 Hz): the sum and difference (Example 2.40.2). The second example in this section illustrates, for only one specific octave of piano pitches, the approximate sum and difference pitches produced with the sine-wave generator set at 220 Hz, as at the beginning of Mantra.

Example 2.40.2

(Resultant pitches produced for one octave on the piano, with the sine-wave generator at 220 Hz [approximate to the nearest quarter-tone])

As Harvey[136] mentions in his book the piano pitches of unison, subdominant, dominant and octave "produce especially euphonious harmony". If the sine-wave generated tones are considered as representing "tonics" (hereinafter referred to as prototonics) then, as the mantra is heard against its inversion on the sine-wave generator throughout the thirteen sections of the work,[137] there will usually be two prototonics per section (the exceptions occurring when the mantra and its inversion are in unison (Example 2.40.3), thus generating a further form of pitch-orientation to limit the overall set-structure of Mantra.

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136 The Music of Stockhausen - an Introduction, Jonathan Harvey, p. 126.

137 referred to by capital Roman numerals (e.g. II).

Example 2.40.4

(Mantra The characteristics of each pitch)

Characteristic	Property
1	Regular repetition
2	Accent at the end
3	Normal
4	Acciaccatura decoration around the note
5	Alternating between two notes
6	Chord occurring with the note
7	Accent at the beginning
8	Chromatic connection from previous note
9	Staccato
10	Irregular repetition "morse"-like
11	Upper mordant (becoming trill)
12	sfz (fp) "echo" effect
13	Fast upwards arpeggio starting below note and leading up to it

Example 2.40.3

(Mantra, the mantra and its inversion)

A mantra is a word or phrase which is repeated many times over in an effort to either raise the utterer to a more exalted plain, or perform a spell. This repetition is all that is heard in Mantra; the mantra or its inversion is repeated over and over again.[138]

The mantra consists of thirteen pitches (Example 2.40.3), of which two are the same (1 and 13). In the example the mantra and its inversion are presented as they appear played on the sine-wave generators. As was mentioned earlier in this discussion, three sections (I, VIII and XIII) have only one prototonic, thus giving the aural sensation of an overall tonal centre "A" with a move to "Eb" just past the half-way point (bar 491segue). However Mantra is not quite so simple as this; the mantra's individual pitches have unique characteristics which are first presented in bars 3 to 10, rather along the same lines as Stockhausen used in Formel (1951): these characteristics are given in Example 2.40.4. These thirteen characteristics are then used to identify the thirteen sections of the composition: each section containing one basic characteristic, with the other twelve included on a secondary plane,

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138 Further consideration of this may be found in the composer's programme note to the British premiere: a selection from Sri Aurobindo - or the adventures of Consciousness by Satprem.

accompanying the slow succession of the sine-wave generated pitches.[139] Throughout Mantra the mantra itself occurs in a number of different guises. The longest form being that on the sine-wave generators, the second being played by the crôtales, the third as the main mantra within each section, and fourthly as the subsidiary presentations within each section of the piece. Thus the mantra is repeated unchanged throughout the work.

Although the above statements are fundamentally valid, Stockhausen does use scales of transformation of the chromatic scale to construct further mantra-sets. For the basic mantra-set (with a range of a major ninth) the normal chromatic scale is used and the form of the mantra is as in Example 2.40.3. By successively omitting certain steps in the chromatic scale the composer builds up eleven further "scales" upon which to construct the mantra (this may easily be seen in the first expansion [scale 2] where one semitone is bypassed every so often). Example 2.40.5 illustrates the twelve scales used in Mantra along with the interval succession used.

If the opening presentation of the mantra's pitches and characteristics is considered, without the decorations, (Example 2.40.6) then it may be seen that there are four segments or limbs (Stockhausen terms them "Gliede").

Example 2.40.6

(Mantra, showing the basic duration character)

The first limb contains four pitches with four differing durations:

A ♩ B 𝅗𝅥 G♯ 𝅗𝅥. E 𝅝 total duration 10

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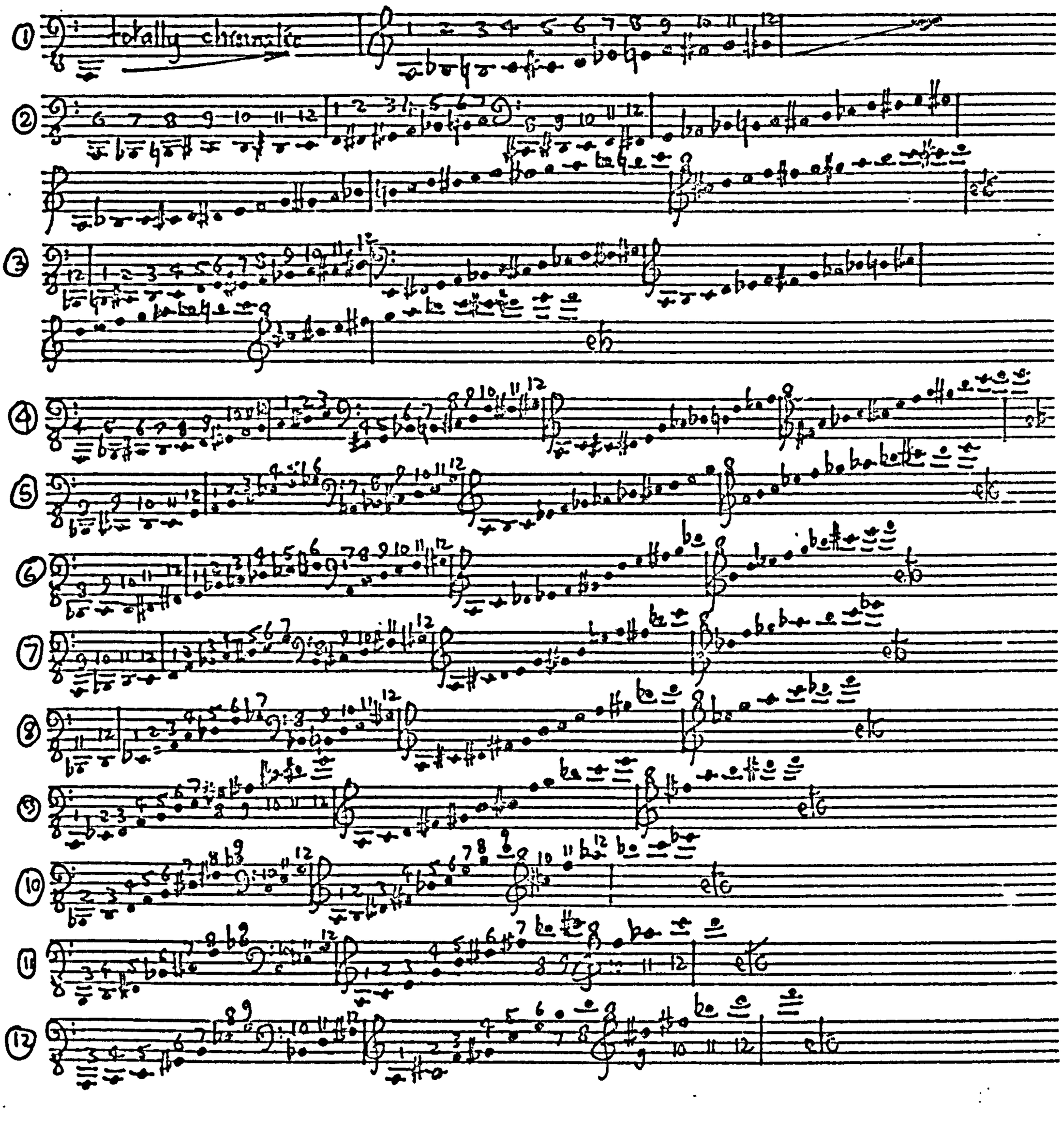
[139] Further consideration will be found later in this section

Example 2.40.5

(Mantra, scales of expansion of pitch)



This is followed by a pause worth three quarter-notes. The second limb contains two pitches (F and D) repeated three times - six pitches in all:

F♩ D♩ F♩ D♩ F♩. D♪ total duration 6

Then there ensues a pause worth one half-note. The third limb again contains four pitches, one of which (C) is played twice: five pitches in all:

G𝅗𝅥. Eb𝅗𝅥 Db𝅗𝅥 C𝅗𝅥. C𝅝 total duration 15

This is followed by a puase worth one quarter-note. The final limb contains three pitches:

Bb𝅝 Gb𝅗𝅥 A𝅝. total duration 12

There then ensues a closing pause worth a whole-note. Naturally this gives thirteen pitches, and with each pitch having a different duration within its limb (Example 2.40.7), there is a total duration relationship of 10:6:15:12 which with the pauses of 3,2,1 and 4 quarter-notes gives an overall duration of 53 quarter-notes for the presentation of the mantra, (these figures of 53 and 13 will prove important as the analysis progresses). Formally, the mantra (duration)-set may be expanded up to four times, to give an overall duration of 212. As in Gruppen this is often done by merely changing the duration unit, e.g.:-

53 ♩ beccmes 53 𝅝
(53 𝅗𝅥) (212 𝅗𝅥)

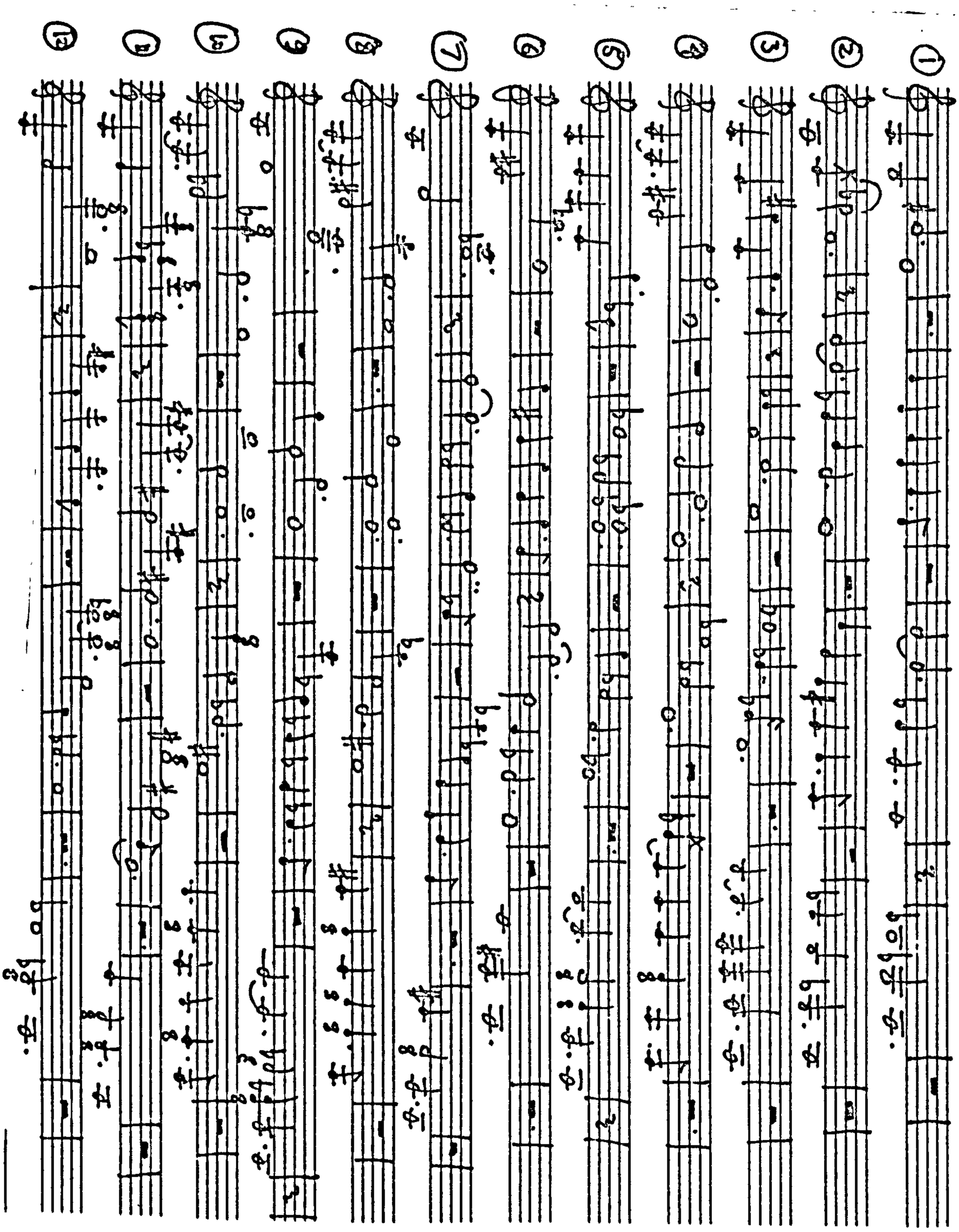
Example 2.40.7

(Mantra, Duration sequence)

A	B	G♯	E							F	D	F	D	F	D				
1	2	3	4	3						1	1	1	1	1½	½		2		
									(ie	2	2	2	2	3	1)				
G	Eb	Db	C	C															
5	2	1	3	4	1					Bb			Gb			A			4
										4			2			6			

Example 2.40.8

(Mantra, mantra-expansions)



Alternatively it may be contracted by up to a factor of eight to a duration of 7♩.[140] Thus scales of expansion of intervals are followed through temporally.

Thus, from Example 2.40.5 and Example 2.40.7 it is possible to construct the varying expansions of the mantra (Example 2.40.8): as it may be seen in this example, the composer often splits the pitch/duration properties of the specific limbs and distributes them around the other limbs.[141]

Having thus considered the various parameters it is now possible to present a complete diagram of the mantra with its pitch, duration and characteristic parameters all shown (Example 2.40.9.).

Since it is neither feasible nor necessary to analyse Mantra completely in this thesis, it is proposed that concentration on the overall form-scheme and analysis of certain illustrative sections will suffice.

The overall form-scheme (Example 2.40.10) shows the inter-relationship between the sine-wave generated pitches, the double-bar lines (often used to specify subdivisions in the time-expansions of the mantra) and the pitches generated by the crotales, along with the locations of the main mantras in the work. The crotales play the characteristic sound of each pitch before presenting that pitch in the mantra-set. As may be seen from the figure (Example 2.40.10) the crotales present the mantra itself first of all, and then its inversion, irrespective of player,

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140 Stockhausen distorts the direct division system to base ten to maintain a unity-orientated standard. Thus

$$2 \times 14 = 27 \text{ and } 2 \times 27 = 53$$

141 In the real world of Mantra the composer often distorts matters even more, especially in the duration elements, for, one hopes, musical reasons.

Example 2.40.9

(Mantra, mantra with pitch, duration and characteristic parameters shown)

Example 2.40.10

(Mantra, overall form-scheme)

This example is to be found in the pocket at the rear of this thesis

whereas the sine-wave generators go through the mantra (operated by the first pianist) and its inversion (operated by the second pianist) at the same time.

There now follows detailed analysis of sections I, II, XI and XIII.

Section I

This section starts at bar 3[142] and finishes at bar 60/61.

The main mantra in this section uses scale 1, with duration approximately fourfold expanded; the predominant characteristic is that of characteristic 1. Although the whole section is shown in Example 2.40.11, the breakdown of the main mantra is also separately illustrated (Example 2.40.12): from this it may be seen that Stockhausen starts of with the fourfold expansion but then relapses into an extremely approximate version thereof (especially towards the end). Within this section the sine-wave generators are tuned to A 220 Hz.

Whilst this main mantra is being played there are also occurring twelve subsidiary mantras (thus making thirteen mantras in the section). These subsidiary mantras often occur in the ideal form (subsidiary mantra 1[143] for example), though the composer does sometimes distort them slightly by omitting rests, especially at the end, or incorporating a slight prolongation of the occasional pitch. The subsidiary mantras in this section occur as follows:-

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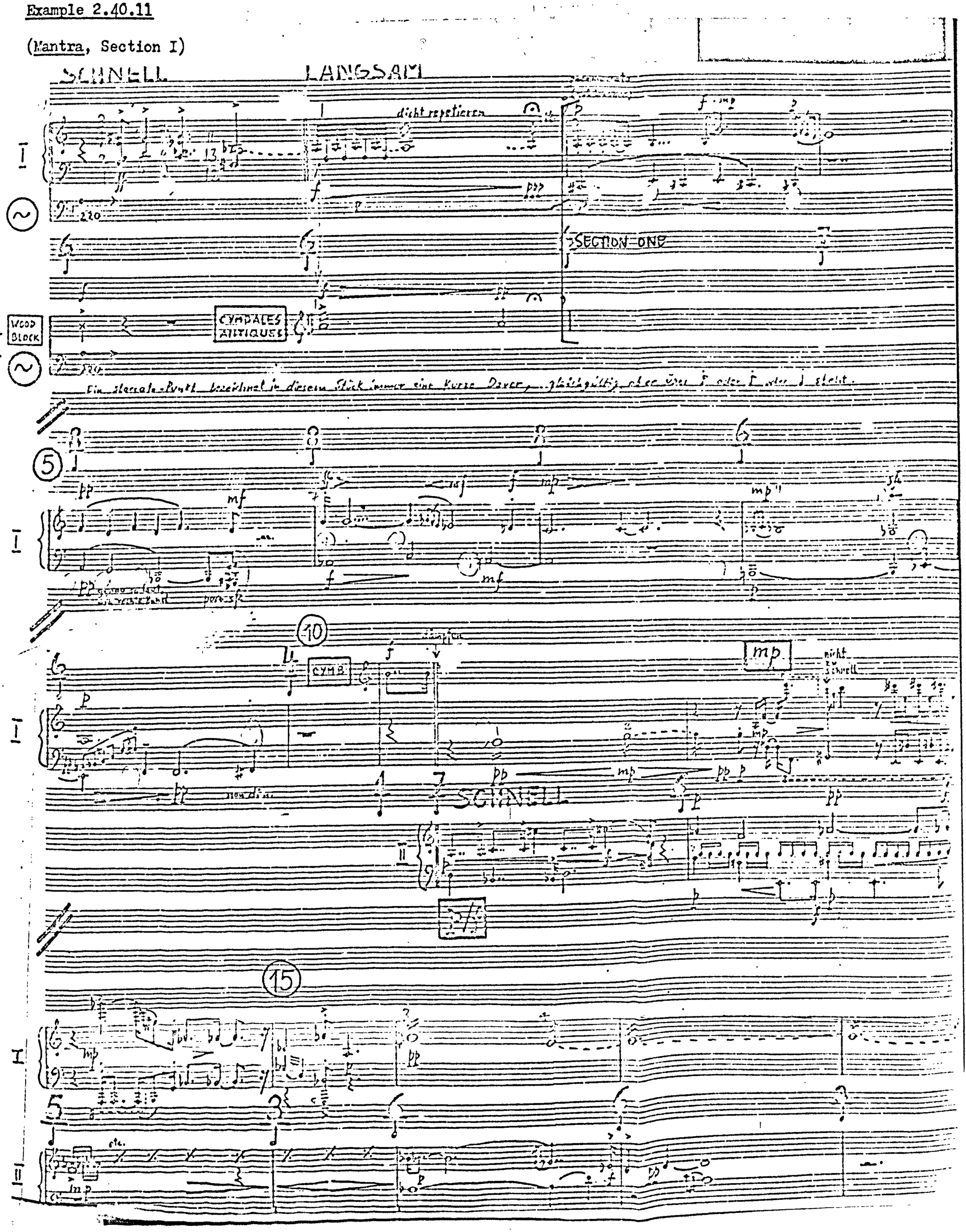
142 Possibly bar 2

143 SM1

Example 2.40.11

(Mantra, Section I)



25

30

35

40

trennen

l. 2

mf

ruhiger

staccato

f

f

p

50

f

morsen

p

SEHR LANGSAM

etc.

~ klirrt im kleinem Bereich

langsam

55

ff

tr

p

mp

tr

tr

tr

~ etc. klirrt im kleinem Bereich

langsam

60

end of Section One

sfz

sfz

etwas breiter

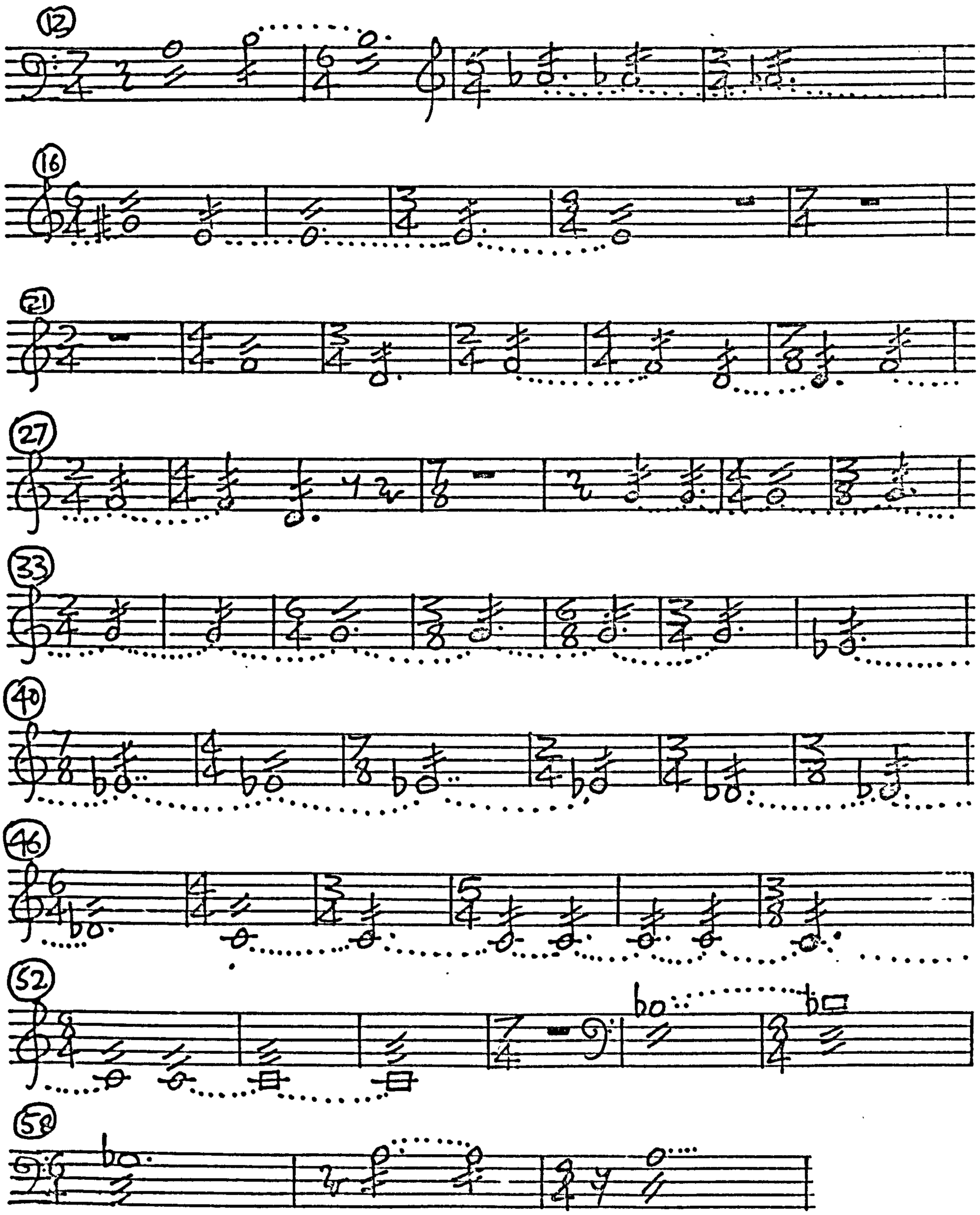
LANGSAM

etc.

~ langsame Gliss

Example 2.40.12

(Mantra, Section I: Main mantra)



Subsidiary mantra	bars	Scale	Duration expansion	Ideal or not
SM1	3 - 10	1	1	Ideal
SM2	12 - 21	3	1	Ideal
SM3	13* - 15	12	1/4	No
SM4	19* - 20*	8	1/8	No
SM5	22 - 25	9	1/4	No
SM6	26 - 30*	6	1/4	No
SM7	30 - 38	11	1/2	No
SM8	39 - 46	7	1/2	Ideal
SM9	47 - 52	5	1/2	Ideal
SM10	53 - 70[144]	4	2	Ideal
SM11	56	2	1/8	No
SM12	59 - 60	10	1/4	No

* the subsidiary mantra starts or finishes in the asterisked bar.

All thirteen mantras in this section are untransposed, starting and finishing on A - the first pitch of the basic mantra-set, and also the pitch of the sine-wave generator. At the conclusion of this section (bar 61) the pitches A and B are heard: probably indicative of the move to B for the mantra (sine-wave generator) in the next section; this is further borne out by the fact that the mantras in Section II all start on B (i.e. transposed up a whole tone). The breakdown of the subsidiary mantras is given for Section I (Example 2.40.13) as it is the first to be discussed.

As was previously mentioned, all the mantric characteristics are also present in this section:-

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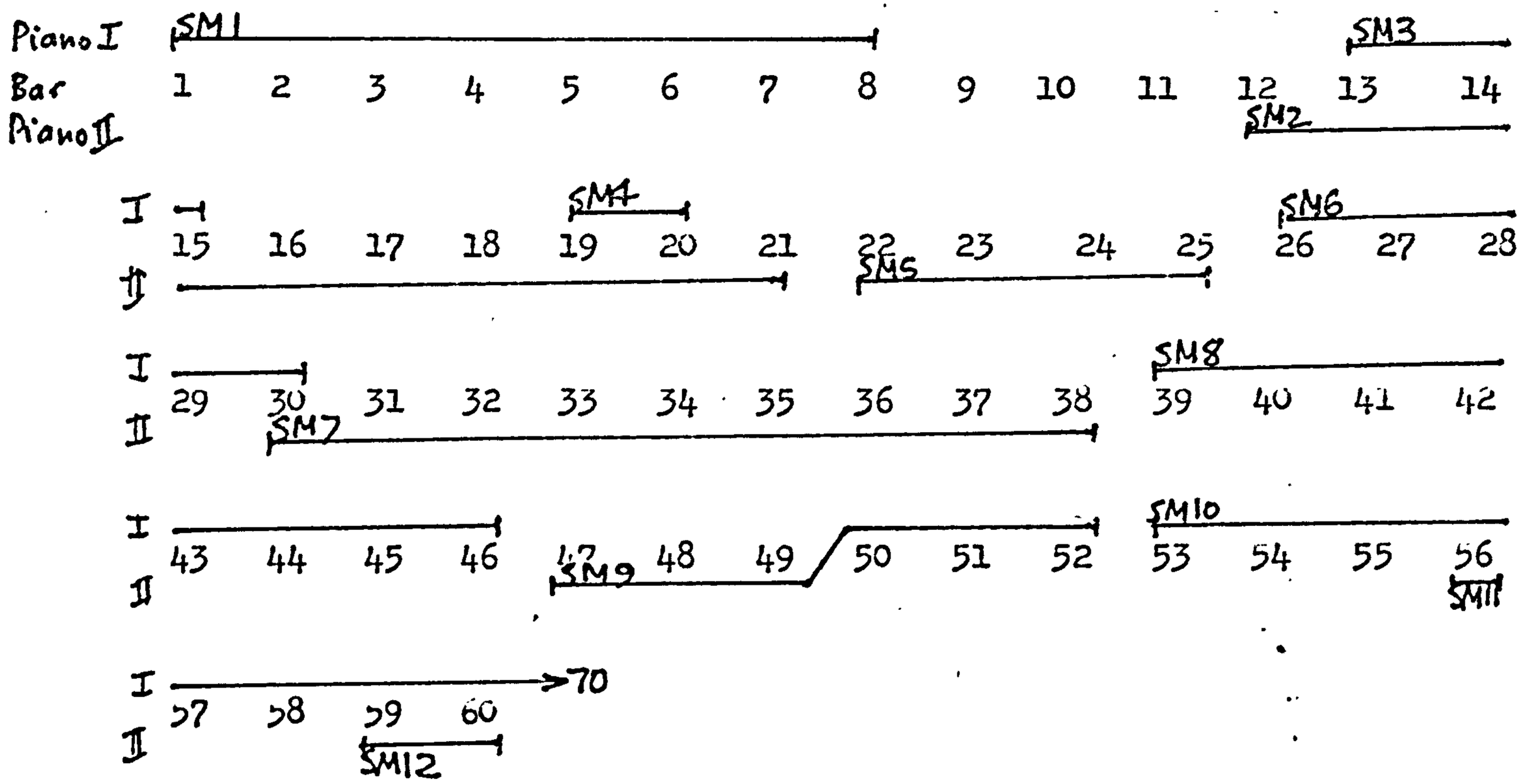
144 SM10 runs into Section II

Example 2.40.13

(Mantra, Section I: Subsidiary mantras)



Characteristic	bars	Number of quarter-notes present
1	3 - 60	
2	12 - 13	13
3	14 - 19*	26
4	19* - 20	11 (and rests in bar 21 = 13)
5	22 - 25	13
6	26 - 29	13
7	30 - 38	26½
8	39 - 46	26½
9	47 - 52	26½
10	53 - 55*	22
11	55* - 58	22
12	59 - 60/61	16
13[145]	62 - 65	13[146]

Section II

This section starts at bar 62 and finishes at bar 88.

The main mantra in this section uses expansion scale 3, transposed up a tone, with duration approximately twofold expanded: the predominant characteristic is that of characteristic 3. The whole section will not be illustrated (as was done in Section I) as reference to the score by the reader will suffice. Within this section the sine-wave generators are tuned to B (250 Hz) and G (208 Hz).

Whilst this main mantra is being played there are also occurring twelve subsidiary mantras (as well as the tail of SM10/Section I), which again may undergo greater or lesser degrees of distortion at the composer's discretion. The subsidiary mantras in this section occur as follows:-

---

145 This characteristic starts in Section II, but may possibly be regarded as part of Section I as the sine-wave generator has not yet reached B.

146 Harvey quite rightly draws attention to the number of occurrences of 13 or its multiples in this table.

Subsidiary mantra	Bars	Scale	Duration Expansion	Ideal or not
SM1	62/65	1	1/2	Almost
SM2	68*	3	1/8	Not
SM3	68*/69	12	1/16	Not
SM4	71/72	8	1/8	Not
SM5	73/74	9	1/8	Not
SM6	75/76	6	1/8	Not
SM7	77/78	11	1/8	Not
SM8	79/80	7	1/8	Not
SM9	81/82	5	1/8	Not
SM10	83/84	4	1/8	Not
SM11	85/86	2	1/8	Not
SM12	87/88	10	1/8	Not

SM5 is imitated in a much expanded and pointed form in bars 75* to 79 (Piano II).

SM8 is imitated in a much expanded and pointed form in bars 79* to 83* (Piano II): it is followed by an inversion of the mantra in expansion scale 9 from bar 83* to bar 86, with repeated ending 87 - 88 (Piano II).

All thirteen mantras in this section are transposed up a whole tone, starting and finishing on B, the second pitch of the mantra-set. The breakdown into unit lengths of the subsidiary mantras is not given for this or subsequent sections as its application was demonstrated in Section I.

Section XI

This section starts at bar 611 and finishes at bar 640.

The main mantra in this section uses expansion scale 2, transposed up a semitone, with duration approximately unexpanded: the predominant characteristic is that of characteristic 11. As the break-

down of a main mantra has already been illustrated in Section I, this will not be repeated in Section XI.

Whilst this main mantra is being played there are also occurring thirteen subsidiary mantras which are detailed in the table below:-

Subsidiary mantra	Bars	Expansion Scale	Duration Scale	Ideal or not
SM1	611/	1	1/8	Not
SM2	612/613	3	1/8	Not
SM3	614/615	12	1/8	Not
SM4	616/617	8	1/8	Not
SM5	618/619*	9	1/8	Not
SM6	619*/621*	6	1/8	Not
SM7	621*/623	11	1/8	Not
SM8	624/625	7	1/8	Not
SM9	626/627	5	1/8	Not
SM10	628/629	4	1/8	Not
SM11	630/631	2	1/8	Not
SM12	632/633*	10	1/8	Not
SM13	633*/637	6	1/8	Not

Bars 638 - 640 contain an exchange of phonemes between the pianists, whilst the chord from bar 637 is sustained through bars 638 and 639, and altered in bar 640. All the mantras in this section are transposed up a semitone, starting and finishing on B♭ , the eleventh pitch of the mantra-set.

Section XIII

This section starts at bar 673 and finishes at bar 887 (the last bar of the composition). It may best be considered in two parts.

Firstly, bars 692 - 847 consist basically of rapid repetitions of the mantra and its inversion with occasional chordal interjections. These bars are really a synthesis of the whole composition, containing as they do, all the mantras and their scalar expansions so far used in

Mantra. In other words, not only do the first thirteen occurrences of the mantra (bars 693 - 704) each begin on A (the first pitch in the basic mantra-set (Example 2.40.3), but the order of their scalar expansion sequence is also that of the thirteen pitches in the basic mantra-set. This is illustrated in Example 2.40.14. The second group each start on B (3^{147} in the basic mantra-set - the second pitch), the third on G♯ (12^{147} in the basic mantra-set - the third pitch) and so on.

Duration-wise the mantra is reduced to its barest essentials - an arpeggio-like figure with virtually all the notes equal in length.

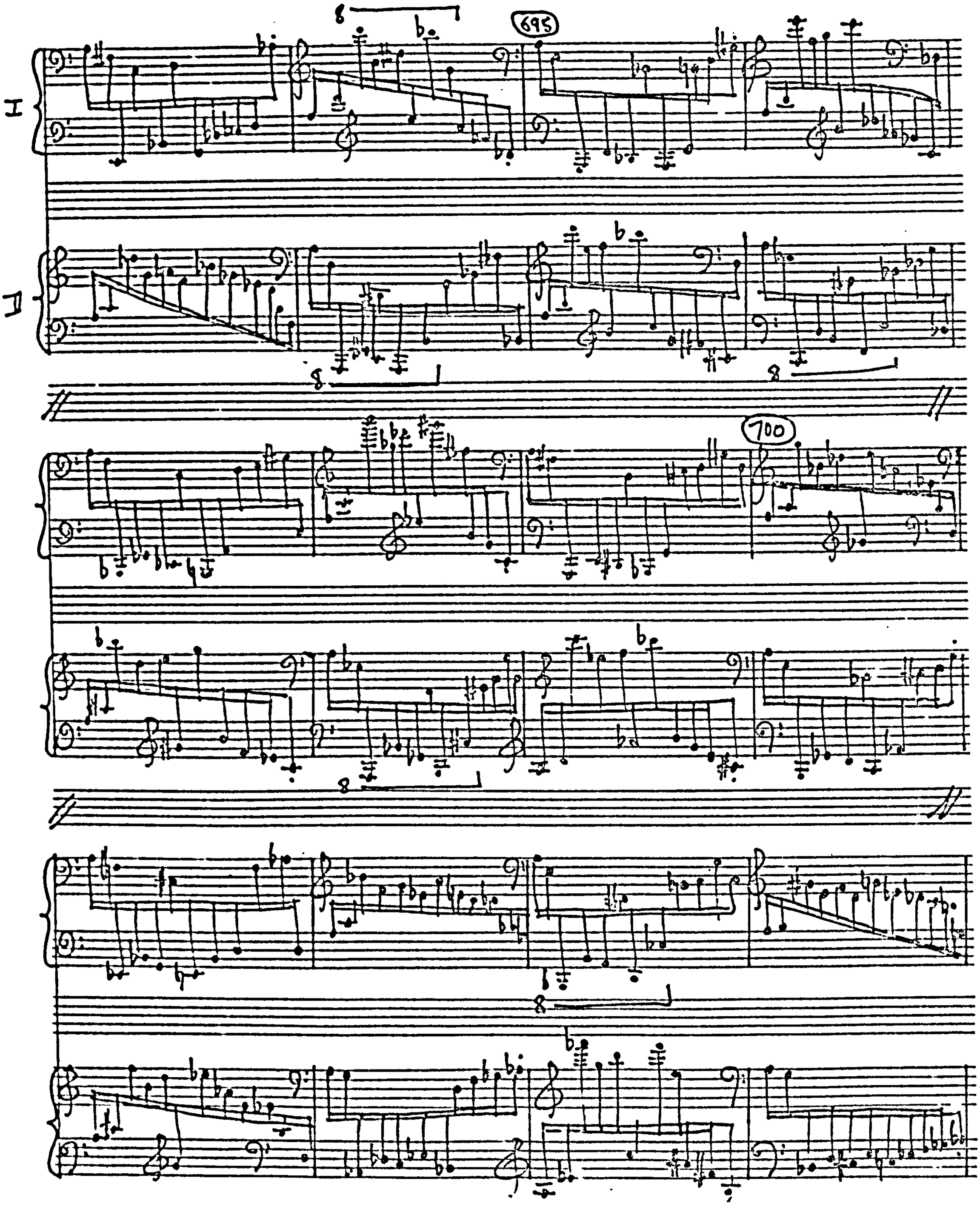
During the course of these bars chordal interjections occur: vertical aggregations of pitches in the mantra or its inversion. An instance of this may be found in bars 729/730 (Example 2.40.15). In bar 729 Piaro II has the mantra transposed up a major seventh (note 3 in the mantra sequence/pitch 12) in expansion 10, the remaining two pitches C♯ (277 Hz) and G♯ (415 Hz) occurring in the tetrachord at the beginning of 730. In bar 730 Piano II has the inversion of the mantra in the same transposition, but this time in expansion 1: the first four pitches (1, 11, 2 and 6) occurring in the once-repeated tetrachord at the beginning of the bar, the following seven linear pitches corresponding to pitches 5 to 12 (pitches 4 and 1 being missed out in the composer's presumed intention of building up the tension in the coda). In bar 729 Piano I has the inversion of the mantra transposed up a major seventh in expansion 10: the first six pitches are presented linearly and the succeeding seven as a heptachord. In the following bar Piano I has the mantra (again transposed up a major seventh) in expansion 1: the first

---

147 These are not pitch-classes on the base twelve(0→11) system as 3 will change from "octave" to "octave" as $1 \not\equiv 0 \pmod{7}$ is not the same except in the basic scale-expansion.

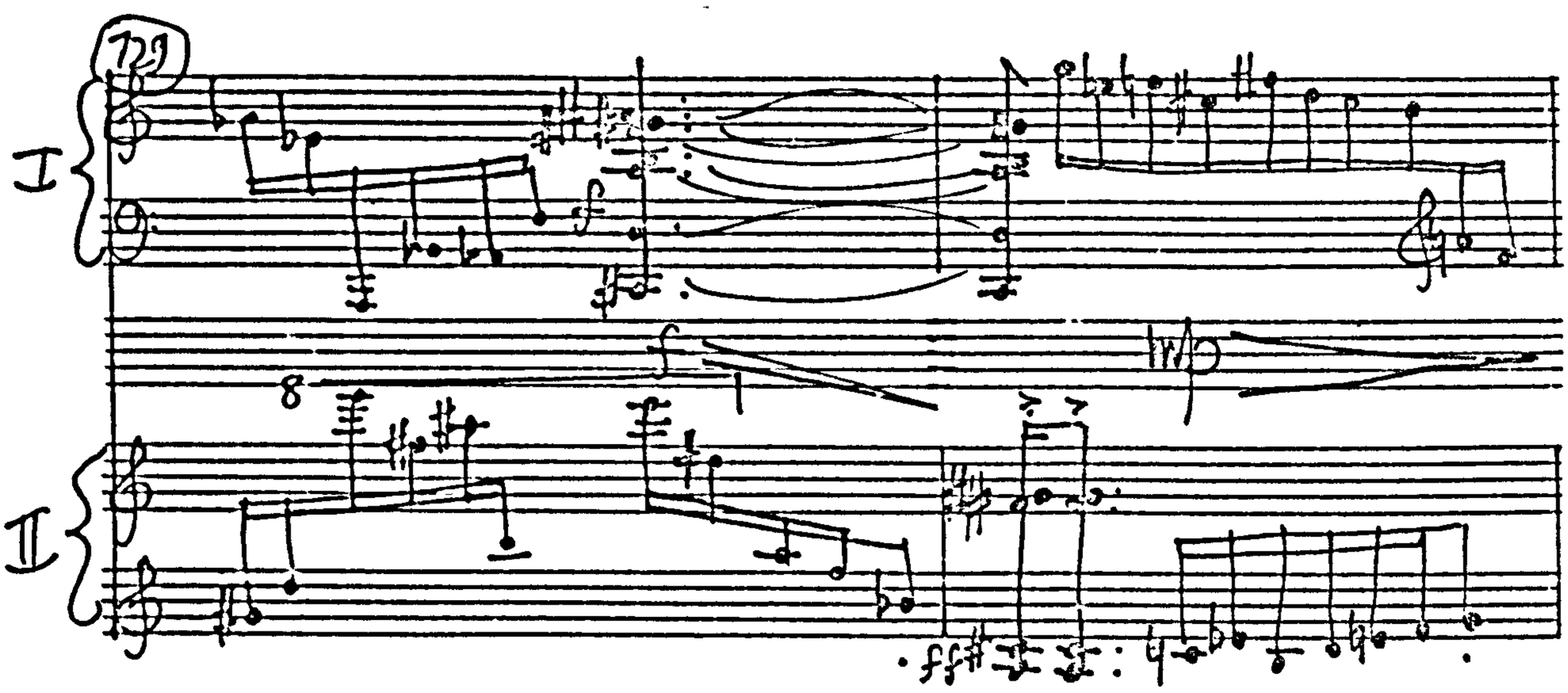
Example 2.40.14

(Mantra, Bars 693 - 704)



Example 2.40.15

(Mantra, Bars 729 - 730)



two pitches (1 and 3) occurring at the top of the heptachord carried over from the previous bar, the following ten linear pitches corresponding to pitches 12 - 10 in the basic mantra-set: the final pitch (G♯ - 415 Hz) being omitted. (As so often occurs in this section, the composer only uses the first twelve of the thirteen pitches in the mantra: possibly the reason why the section is 13 x 12 = 156 mantras long).

Secondly it is necessary to consider bars 673 - 691 and 848 to the end of the composition. With the exception of bars 688 - 692 which serve as a kind of introduction to the previously discussed middle 156 bars: these measures form a "section" all of their own.

The main mantra runs as an untransposed mantra with an expansion scale 1: a succession of the top notes of the hexachords (Example 2·40.16) in bars 855 - 880, with an imprecise duration expansion.

The subsidiary mantras may best be demonstrated by recourse to the tabulated form used in previous sections:-

Subsidiary mantra	Bars	Expansion Scale	Duration Scale	Ideal or Not
SM1	673/676	1	1/4	Almost
SM2	677/679*	3	1/8	Not
SM3	679*/681	12	1/8 Approx	Not
SM4	682/683*	8	1/8	Not
SM5	685/687*	9	1/8	Not
SM6	855/858*	6 INV	1/4	Not
SM7	858*/861	11 INV	1/4	Not
SM8	862/865*	7	1/4	Not
SM9	865*/867*	5	1/4	Almost
SM10	867*/870	4 INV	1/4	Almost
SM11	871/881	2	1	Ideal
SM12	872*/881	10	1/4	Almost
SM13	884/887	1	1/4	Ideal

(INV = inversion)

Example 2.40.16

(Mantra, Bars 855 - 880 [hexachords only])

As may be seen from the above analyses, Mantra is built on four levels: the sine-wave generated tones, the crôtales, the main mantras and the subsidiary mantras. It is now possible to say that all the sections are derived from the archetypal mantra of the composition (Example 2.40.3): this is illustrated in Example 2.40.17.

From Example 2.40.17 it is possible to see the following points:-

I The sine-wave generated pitches expound the mantra against its inversion; the mantra being the pitch sequence 1, 3, 12, 8, 9, 6, 11, 7, 5, 4, 2, 10, 1. These pitch changes delineate the thirteen sections of the composition.

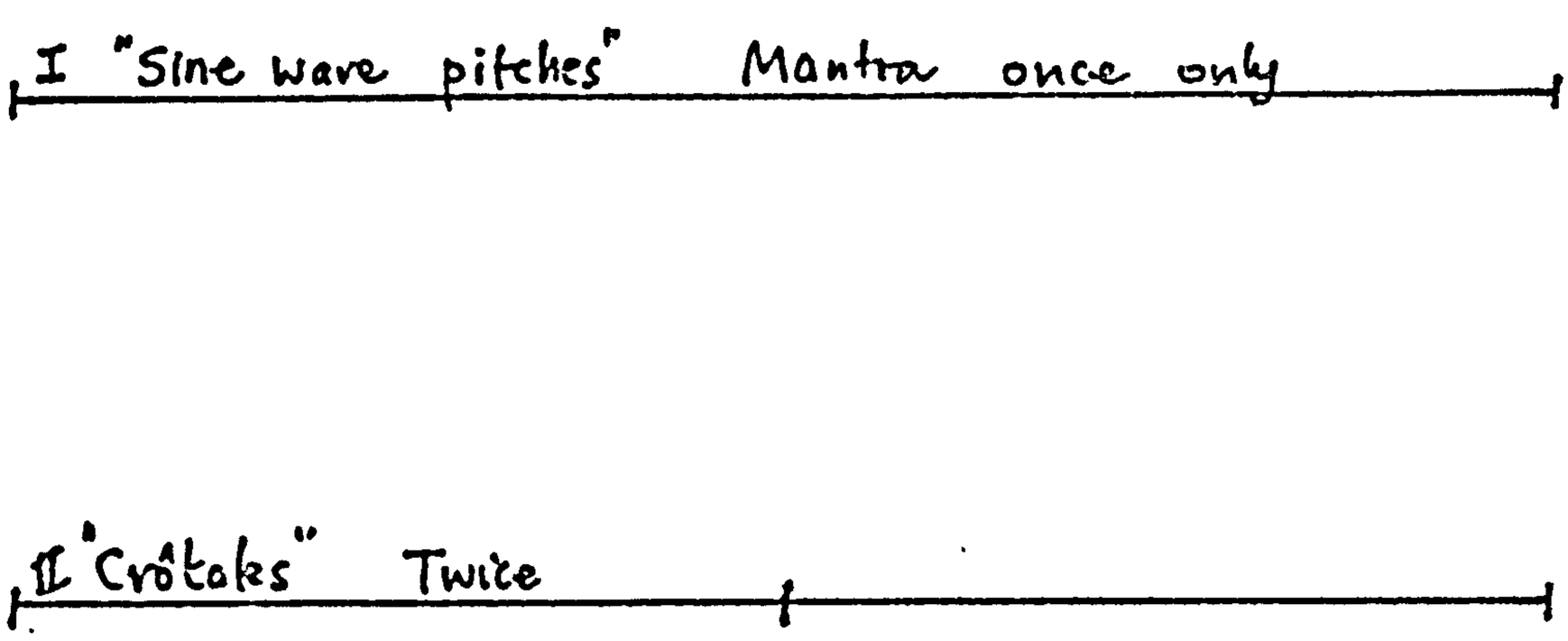
II The crôtales are in relation to the sine-wave generators 1:2, that is to say that broadly speaking the crôtales take half the time the sine-wave generators do to change events, proceeding through the mantra followed by its inversion during the course of the composition.

III The main mantras are thirteen in number. The first mantra starts on the pitch A (pitch 1 in the "mantra"), the second on the pitch B (pitch 3 in the "mantra" - the second in sequence), the third on the pitch G♯ (pitch 12 in the "mantra" - the third in the sequence), and so on up to pitch A (pitch 13 = 1 in the "mantra" - the thirteenth in the sequence).

IV The subsidiary mantras each start on the pitch on which the main mantra of the section starts (e.g. in section IV, the main mantra starts on E as do all the subsidiary mantras). The order of the subsidiary mantras is then exactly the same in each section: their sequence (1, 3, 12, 8, 9, 6, 11, 7, 5, 4, 2, 10, 1) is one of scales of transposition of

Example 2.40.17

(Mantra, Form-scheme)



the mantra (e.g. in Section I, which being based on A is untransposed, the first subsidiary mantra is written in expansion scale 1, the second in expansion scale 3, the third 12, and so on).

Thus it is seen that, with the exception of the short-wave radio sounds and vocalisations, the whole of Mantra has been macro- and microcosmically derived by the composer from the archetypal set of the composition: a perfect example of "the identity of everything".

Postscript

Within the so-called "avant-garde" field Stockhausen stands as one of the most important composers writing today, although time alone will tell if this is to be retrospectively true. It is easy to detect innovation or worthwhile experimentation in the music of contemporaries (it is only necessary to think of Cage's advocation of "radio-music" in 1942 and his use of prepared piano in 1944, the inauguration of the O.R.T.F. "musique concrête" studios in 1948 by Pierre Schaeffer and the many works written there by composers such as Stockhausen and Messiaen, Varèse's Poème électronique of 1958 and Déserts of 1951-54 and many others), but it is only in the music of Stockhausen that all of these are synthesized into a unity of purpose.

It is not easy to decide which are the "best" works of Stockhausen: in fact is almost impossible except within an emotionally orientated subjective environment. Objectively, it is certainly possible to conjecture as to whether group-form-structure works better in Piece A rather than in Piece B. Indeed the preceding chapter has attempted to show those compositions in which the various techniques have succeeded in effecting the evolutionary progress of the composer. However, it is within a subjective frame of reference that the average person (be he or she qualified musician or not), will assess the worth of a composition and, using such a criterion, Stockhausen will be judged on the merits, or otherwise, of works such as Gruppen, Hymnen, Stimmung, Mantra or Tierkreis.

Stockhausen is certainly a Janus-like figure, for his works point both backwards and forwards. The early piano-pieces could be considered as both the swan-song of the expressionist style and the embryonic signpost pointing to things to come in Stockhausen's later output. The influence of Stockhausen has been great: very few composers and

musicians alive today have been unmoved by this composer and his theories. Commitment one way or another is imperative.

In about a century or so it should be possible to assess, in a subjective sense, his emotional intensity as well as his technical craftsmanship although, according to the composer, his approach is not one of Hindemithean craft:-

> "Verstecke, was du komponierst, in dem, was du hörst. Verdecke, was du hörst. Stelle etwas neben das, was du hörst. Stelle etwas weit ausserhalb dessen, was du hörst. Unterstütze, was du hörst. Setze eine Ereingnis, das du hörst, für lange Zeit fort. Verwandle ein Ereignis bis zur Unkenntlichkeit. Verwandle ein Ereignis, das du hörst, in das vorige, das du komponiert hast. Komponiere, was du als nächstes erwartest. Komponiere oft, höre aber auch für längere Zeiten dem zu, was schon komponiert ist, ohne weiter zu komponieren. Mische alle Anweisungen. Beschlünige zunehmed den Strom deiner intuition."[3]

Viewed from the present it is only possible to find the man and his music both impressive and intensely absorbing.

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3 Texte, Band III, p. 99

Hide what you compose in that which you hear. Then hide that which you hear. Put something next to that which you hear. Put something far away from that which you hear. Support what you hear. Prolong an event that you hear for a long time. Transform an event until it becomes unrecognizable. Transform an event that you hear into one which you last composed. Compose that which you expect to hear next. Compose frequently, but listen for long hours to that which is already composed, without composing. Mix all these instructions. Increasingly speed up the current of your intuition.

APPENDICES

1. Compositions: 1950 - 1951 and 1970 - 1975
2. The applications of inserts in Momente
3. Variationen für Klavier, op. 27, III (56 - 66) - Anton Webern
4. Calendar
5. Bibliographies
6. Discography

APPENDIX ONE

Compositions: 1950-1951 and 1970-1975

This Appendix contains details of those works Stockhausen composed prior to Kreuzspiel and after Mantra: further information is given when and where available (Mantra was the last score available for study; scores of Pole/Expo, Für kommende Zeiten and Tierkreis only becoming available in late 1975).

A1.1 Choral (no number)

This work was composed in 1950 and is set for four-part mixed choir. The length of performance is some two minutes.

A1.2 Drei Lieder (no number)

(Three Songs)

1. Der Rebell (Baudelaire)
2. Frei (Anon)
3. Der Saitenmann (Anon)

These three songs were composed during 1950 and are scored for alto soloist accompanied by a small chamber ensemble (flute, 2 clarinets, trombone, percussion, xylophone, piano, harpsichord and strings). Duration is approximately seventeen minutes.

A1.3 Chöre nach Verlaine (no number)

(Choral pieces to texts by Verlaine)

There are three settings of Verlaine for small mixed choir in this composition which was composed in 1950 and lasts some fifteen minutes.

A1.4 Sonatine (no number)

Sonatine for violin and pianoforte was composed in 1951 and, like the preceding three works, is very reminiscent of Schoenberg. Its duration is approximately eleven minutes.

A1.5 Für kommende Zeiten nr. 33

(For days to come)

This work was composed between 1968 and 1970 and, like aus den sieben Tagen, consists of a number of texts (here 17) to be interpreted intuitively.

A1.6 Sternklang nr.34

(Starsound)

Sternklang was composed in 1971 for five groups of players and was first performed during June, 1972 in the English Garden ajoining the Berlin Tiergarten.

A1.7 Trans nr. 35

Trans was also composed during 1971 for orchestra and was first performed at Donaueschingen during August that year. It lasts just under the half-hour. This work was originally conceived during a dream on the night of 9th December, 1970, and is an attempt to convey to the audience this experience of the composer's. One way in which the dream-loke quality is achieved is by separating audience and players with a gauze illuminated by a violaceous light. There are five groups of players, each groups is electronically modulated. Over seventy sections are played which are separated by the reverberation around the hall of a shuttle flying across a loom.

A1.8 Alphabet für Liege nr. 36

Alphabet consists of thirteen musical 'portraits' for soloists and duos. It was composed in 1972.

A1.9 "Am Himmel wandre ich...." nr. 36½

This work is an Indian song written during 1972.

A1.10 Ylem nr. 37

Ylem was composed during 1972 for nineteen players or singers and was first performed in the Queen Elizabeth Hall on March 21st, 1973; later broadcast simultaneously by BBC2 television and BBC Radio Three in stereo. An ylem is the periodic recreation of the cosmos from its monobloc (this occurs approximately every 10^9 years.).

A1.11 Inori nr. 38

This work was written in 1973-74 and is an 'Adoration' for one soloist and orchestra.

A1.12 "Vortrag uber HU" nr 38½

Written in 1974 for solo singer this "recital upon HU" is a realization of HU. HU is the only name of the nameless....this alone is the true name of God (Hazrat Inayat Khan : Sufi Message : quoted on record sleeve DGG 2530442).

A1.13 "Atmen, gibt das Leben" nr 39

"Breathe, give life" is a lightweight composition for mixed chorus. It was composed in 1974.

A1.14 Herbstmusik nr 40

"Autumn-music" was written in 1974 for four players.

A1.15 "Laub und Regen" nr. 40½

"Leaves and Rain" was written in 1974 as a duet for viola and clarinet.

A1.16 Musik im Bauch nr. 41

"Belly-music" was written in 1975 for percussion and musical clocks.

A1.17 Tierkreis nr. 414

"Zodiac" was written in 1975 and consists of twelve melodies representing the star-signs. Each one is typified by a tempo (from the chromatic scale of tempi), a duration and three pitches.

A1.18 Harlekin nr. 42

"Herlequin" was composed for clarinet in 1975.

A1.19 Sirius nr. 43

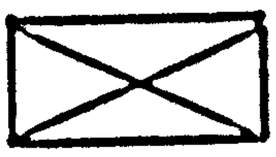
Sirius was composed in 1975 for electronic source, trumpet, bass clarinet, double bass and soprano.

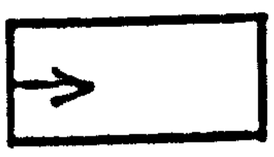
To the best of the author's knowledge Stockhausen has not yet written a work post-dating Sirius.

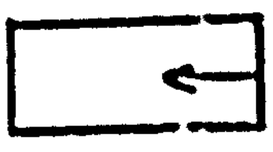
APPENDIX TWO

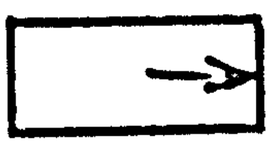
The application of inserts in Momente

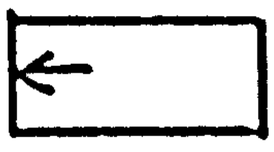
The "Einschube" consist of certain characteristic segments taken from the various moments. They are printed on separate sheets of paper. After the sequence of moments for a particular performance has been established, these inserts are introduced into the score according to various symbols above the moments (these symbols, in the "Bonn" version, are given in Example 2.20.2). There are five basic symbols[6] and two forms of modification:-

1.  moment is inert

2.  introduce an insert from the preceding moment

3.  introduce an insert from the subsequent moment

4.  introduce an insert into the subsequent moment

5.  introduce an insert into the preceding moment

6. 2 or 3 this number is associated with an arrow and means that the operation applies to that moment 2 or 3 distant

7. + - this symbol is associated with an arrow and means that the moment is played twice, the first time with the insert, and the second time without it.

In the form-scheme (Example 2.20.2), it may be seen that the characteristic of the D moment inserts is to receive material, that of the K moment inserts to give and that of the M moment inserts may be to give or to receive.

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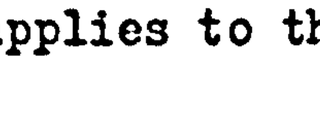
[6] These symbols may be combined as in  . Here an insert is received from both the preceding and subsequent moments.

APPENDIX THREE

Variationen für Klavier, op. 27, III [56 - 66] - Anton Webern

In the following example (Example A3.1), the closing bars of the last movement of Variationen für Klavier op. 27 by Anton Webern have been rewritten on three staves to illustrate the emphasis on three bands of pitch.

Example A3.1

(Variationen für Klavier op. 27, III [56 - 66] - Anton Webern)

APPENDIX FOUR

Calendar

A chronological chart of the life and works of Stockhausen set against some of the more important events in music since 1925.

1925		Berio born Boulez born
1926		Henze born
1928	Stockhausen born, 22nd August Mödrath, Cologne	
1934		Elgar died Holst died Delius died Peter Maxwell Davies born Harrison Birtwistle born
1935	Moved to Attenberg	Berg died
1937		Ravel died
1940		Klee died
1941	Mother exterminated by the Nazis in a lunatic asylum: Stockhausen went to school at Xanten	
1945	Father died in Hungary	Webern died Bartók died Messiaen: Harawi
1946		Boulez: Sonatine for flute and piano
1947	Moved to Cologne and attended the University of Cologne and the Academy of Music there	
1948		Babbitt: Compositions (for four instruments and twelve instruments)
1949		Strauss died Messiaen: Quatre Études
1950	Studies with Frank Martin Choral Drei Lieder Chöre nach Verlaine	Weill died

1951	Zeitlos Kreuzspiel nr. 1/7 Formel nr. 1/6 Married (1) Doris Andrae, 29th December	Schönberg died
1952	Studied with Messiaen and Milhaud in Paris Etude nr. 1/5 Spiel nr. 1/4 Schlagquartett nr. 1/3 Punkte nr. 1/2 Started Klavierstücke I - VIII	Boulez: Structures I
1953	Started lecturing at the "Internationale Ferienkurse für Neue Musik", Darmstadt Appointed collaborator at the Electronic studios of W.D.R. (Cologne) Studie I, nr. 3	Prokofiev died Varèse: Déserts Berio founds Electronic Studio in Milan
1954	Studie II, nr. 3 Phonetic studies at the Univers- ity of Bonn "Die Reihe" first published (edited by Eimert and Stockhausen) Klavierstücke V - VIII nr. 4	Britten: The Turn of the Screw Ives died Cage: 4 m. 33 s. Xenakis: Metastatis
1955	Zeitmasse nr. 5 Gruppen nr. 6 started	Stravinsky: Canticum Sacrum Tippett: The Midsummer Marriage Nono: Il Canto Sospeso Boulez: Le Marteau sans maître Honegger died Martin died Casella died

1956	Klavierstück XI nr. 7	Finzi died
	Gesang der Jünglinge nr. 8 completed	Maderna: Notturno
		Hindemith: Die Harmonie der welt
1957	Gruppen nr. 6 completed	Sibelius died
	Appointed Head of Composition and Analysis, Darmstadt	
1958	First tour of North America	Vaughan Williams died
		Varèse: Poème Électronique
		Berio: Omaggio à Joyce
1959	Zyklus nr. 9	Hauer died
	Carré nr. 10	Messiaen: Catalogue des oiseaux
	Refrain nr. 11	
1960	Kontakte nr. 12 and 12½	Penderecki: Threnody
1961	Originale	Berio: Visage
	Klavierstücke IX - X completed	Milton Babbitt: Vision and Prayer
		Carter: Double Concerto
1962	Momente nr. 13 started	Eisler died
	Punkte revised	Shostakovitch: Symph
		Xenakis: ST/10-1,080
1963	Plus-Minus nr. 14	Hindemith died
		Poulenc died
1964	Mikrophonie I nr. 15	Nono: La Fabbrica illu
	Mixtur nr. 16	
1965	Founder and Artistic director of the Cologne course for New Music	Verèse died
		Cowell died
	Visiting Professor, University of Pennsylvania at Philadelphia	
	Mikrophonie II nr. 17	
	Stop nr. 18	
	Solo nr. 19	

1966	Visiting Professor, University of California, Davis	Blacher: Zwischenfälle bei einer Notlandung
	Telemusik nr. 20	Henze : The Bassarids
	Adieu nr. 21	
	Hymnen nr. 22 and 22½	
1967	Married (2) Mary Baumeister, 3rd April	Kodaly died
	Hymnen completed	
	Prozession nr. 23	
	Mixtur nr. 16½	
1968	Awarded the Nordheim-Westfalen prize for music	
	Visited Mexico and Czechoslovakia	
	Stimmung nr. 24	
	Kurzwellen nr. 25	
	Aus den sieben Tagen nr. 26	
	Spiral nr. 27	
1969	Stop ("Paris version")	
	Third region of Hymnen nr. 22⅔	
	Fresco nr. 28	
	Tunnel-Spiral nr. 27½	
	Opus 1970 nr. 29	
1970	Pole nr. 30	World Fair, Osaka "Expo 70"
	Expo nr. 31	Hamilton: Epitaph for this world and time
	Momente completed	
	Mantra nr. 32	Boulez: cummings ist der Dichter
	Für kommende Zeiten nr. 33	
1971	Sternklang nr. 34	Stravinsky died
	Trans nr. 35	Berio: Bewegung
1972	Alphabet nr. 36	
	"Am Himmel wandre ich..." nr.36½	
	Ylem nr. 37	

1973	Inori nr. 38 started	
	Stop ("London"version)	
1974	Inori nr. 38	
	"Vortrag über EU" nr. 38½	
	"Atmen gibt das Leben" nr. 39	
	Herbstmusik nr. 40	
	"Laub und Regen" nr. 40½	
1975	Musik im Bauch nr. 41	Shostakovitch died
	Tierkreis nr. 41½	Blacher died
	Harlekin nr. 42	
	Sirius nr. 43	

APPENDIX FIVE

Bibliographies

1. The Music of Stockhausen
2. Primary Bibliography
3. Secondary Bibliography
   - (i) Music
   - (ii) Literature

1. The Music of Stockhausen

(all score numbers are Universal Edition)

Choral	UE 15174
Drei Lieder	UE 15174
Chöre nach Verlaine	UE 15174
Sonatine	UE 15174
Kreuzspiel nr. 1/7	UE 13117
Formel nr. 1/6	UE 15157
Étude nr. 1/5	unpublished
Spiel nr. 1/4	unpublished
Schlagquartett nr. 1/3	unpublished
Punkte nr. 1/2 (1952)	UE 13844 (not for performance)
Punkte nr. 1/2 (1964)	UE 13844a (not for performance)
Punkte nr. 1/2 (1966)	UE 13844c
Kontrapunkte nr. 1	UE 12218
Klavierstücke I - IV nr. 2	UE 12251
Elektronische Studie I nr. 3	unpublished
Elektronische Studie II nr. 3	UE 12466
Klavierstücke V - X nr. 4	UE 13675a - UE 13675f
Zeitmasse nr. 5	UE 13673
Gruppen nr. 6	UE 13673
Klavierstück XI nr. 7	UE 12654b
Gesang der Jünglinge nr. 8	unpublished
Zyklus nr. 9	UE 13186
Carré nr. 10	UE 14815 I - UE 14815 IV
Refrain nr. 11	UE 13817
Kontakte nr. 12	UE 13678
Kontakte nr. 12½	UE 14246

Originale nr. 12⅔	unpublished (for availability see text)
Momente nr. 13 (1962/64)	UE 13816
Momente nr. 13½ (Cologne)	UE 15151
Momente nr. 13⅔ (Bonn)	unpublished
Plus-Minus nr. 14	UE 13993
Mikrophonie I nr. 15	UE 15138
Mikrophonie I nr. 15½ (Brussels)	UE 15139
Mixtur nr. 16 (1964)	UE 14261
Mixtur nr. 16½ (1967)	UE 13847
Mikrophonie II nr. 17	UE 15140
Stop nr. 18	UE 14989
Stop nr. 18½ (Paris)	UE 14989
Solo nr. 19	UE 14789
Telemusik nr. 20	UE 14807
Adieu nr. 21	UE 14877
Hymnen nr. 22	UE 15142
Hymnen nr. 22½	UE 15143
Hymnen nr. 22⅔ (Dritte Region)	UE 15145
Prozession nr. 23	UE 14812
Stimmung nr. 24	UE 14805
Stimmung nr. 24½ (Paris)	UE 14805
Kurzwellen nr. 25	UE 14806
Aus den sieben Tagen nr. 26	UE 14790 (also now available in French and English)
Spiral nr. 27	UE 14957
Tunnel-Spiral nr. 27½	unpublished (for availability see text)
Fresco nr. 28	UE 15147
Opus 1970 nr. 29	unpublished

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Expo nr. 31	Stockhausen-Verlag
Mantra nr. 32	Stockhausen-Verlag
Für kommende Zeiten nr. 33	Stockhausen-Verlag
Tierkreis nr. 41½	Stockhausen-Verlag

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Piano Sonata in d, op. 31 (ii)	Beethoven
Le soleil des eaux	Boulez
War Requiem	Britten
Concerto Martin Pescatore	Dalby
Nocturnes	Debussy
Rondeau: Ce moys de may	Dufay
Quatre Études	Messiaen
Piano Sonata in a, K. 310	Mozart
Bolero	Ravel
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APPENDIX SIX

Discography

Kontrapunkte	VICS 1239[8]
Klavierstücke I - XI (Aloys Kontarsky)	CBS 77209
Klavierstück VIII (Burge)	STGBY 637
Klavierstück IX, XI (Bucquet)	Philips 6500101
Klavierstück X (Rzewski)	WER 60010[8]
Elektronische Studie I and II	DGG LPE 17243
Gruppen	DGG 137002
Gesang der Jünglinge	DGG LPE 17243
Gesang der Jünglinge	DGG 138811
Zyklus (Caskel)	Time 58001[8]
Zyklus (Caskel/Neuhaus)	WER 60010[8]
Carré	DGG 137002
Refrain (Aloys Kontarsky, Bernhard Kontarsky, Caskel)	Time 58001[8]
Refrain (Aloys Kontarsky, Caskel, Stockhausen)	STGBY 638
Kontakte (electronic tape version)	DGG 138811
Kontakte (Aloys Kontarsky and Caskel)	STGBY 638
Kontakte (Tudor and Caskel)	WER 60009[8]
Momente	DGG [9]
Mixtur	DGG 137012
Mikrophonie I and II	MS 7355
Solo (Globokar)	DGG 137005[8]
Telemusik	DGG 137012
Hymnen (electronic tape version)	DGG 139421/22

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8 These records have either been deleted or are only available on import.

9 A recording of the "Bonn" version of Momente is due for release in 1975

Prozession	STGBY 615
Stimmung	DGG 2543003
Kurzwellen	DGG 2707045
Aus den sieben Tagen	DGG 2720073
Spiral (electric recorder)	WER 325[8]
Opus 1970	DGG 139461
Mantra	DGG 2530208
Greatest Hits of KarlHeinz Stockhausen	DGG 2612023
Stop	DGG 2530442
Ylem	DGG 2530442
Adieu	DGG 2530443
Kontrapunkte	DGG 2530443
Kreuzspiel	DGG 2530443
Zeitmasze	DGG 2530443
Zyklus	CFP *******[10]

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10 A recording of Zyklus is due for release in 1976