STRUCTURE AND EXPERIENTIAL TIME

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Now that the elementary processes of serial music have been made clear, the questions most immediately arising are those of musical organisation. A work of Webern provides a paradigm for one of the most urgent of them: what organic connection is there between structure and experiential time?

By *experiential time* we mean the following: when we hear a piece of music, *processes of alteration* follow each other at varying speeds; we have now more time to grasp alterations, now less. Accordingly, anything that is immediately repeated, or that we can recollect, is grasped more rapidly than what alters. We experience the passage of time in the intervals between alterations: when nothing alters at all, we lose our orientation in time. Thus even the repetition of an event is an alteration: something happens – then nothing happens – then again something happens. Even within a single process we experience alterations; it begins, it ends. The interval between beginning and end we call *duration*; the interval between beginnings of two successive processes we call the *interval of entry*. The perception of a single note rests in the last analysis only on the fact that we experience periodic or aperiodic fluctuations of the air pressure. In all perception we have to do only with variable alterations that have a particular structure; these various *time-structures* we experience qualitatively through various concepts (parameters). A repetition has the smallest *degree of alteration*, a wholly surprising event the greatest.

Experiential time is also dependent on the *density of alteration*: the more surprising events take place, the 'quicker' time passes; the more repetitions there are, the 'slower' time passes. But there is surprise only when something unexpected occurs: on the basis of previous events we expect a particular kind of succession of alterations, and then something occurs that is quite unlike what we expected. At that moment we are surprised: our senses are extremely sensitive to absorb the unexpected alteration, to adjust themselves to it. Thus after a short time a constant succession of contrasts becomes just as 'boring' as constant repetition: we stop expecting anything specific, and cannot be surprised: the overall impression of a succession of contrasts is levelled down to a single information.

The *degree of information* is thus greatest when at every moment of a musical flow the *momentum of surprise* (in the sense we have described) is greatest: the music constantly has 'something to say'. But this means that the experiential time is in a state of flux, constantly and unexpectedly altering.

An apparent paradox is immediately explained: the greater the temporal density of unexpected alterations – the information content – the more time we need to grasp events, and the less time we have for reflection, the quicker time passes; the lower the *effective* density of alteration (not reduced by recollection or the fact that the alterations coincide with our expectations), the less time the senses need to react, so that greater intervals of experiential time lie between the processes, and the slower time passes.

Experiential time is thus dependent firstly on the measured tempo (determining the speed of the shortest unit of measure for the time-intervals of the processes) and on the speed of the successive processes: experiential time can thus pass very slowly when there is a succession of extremely quick processes that, however, alter little or not at all (for example in regular periodic processes) just as, vice versa, experiential time can pass very quickly in a slow tempo or a slow succession of processes if there is a high degree of alteration.

Thus it is always necessary, in order to attain a high, effective degree of alteration and thus also a high momentum of surprise, that we have for a time experienced a certain logic of the flow, on the basis of which we begin to experience in advance, to expect something.

If we realise, at the end of a piece of music – quite irrespective of how long it lasted, whether it was played fast or slowly and whether there were very many or very few notes – that we have 'lost all sense of time', then we have in fact been experiencing time most strongly.

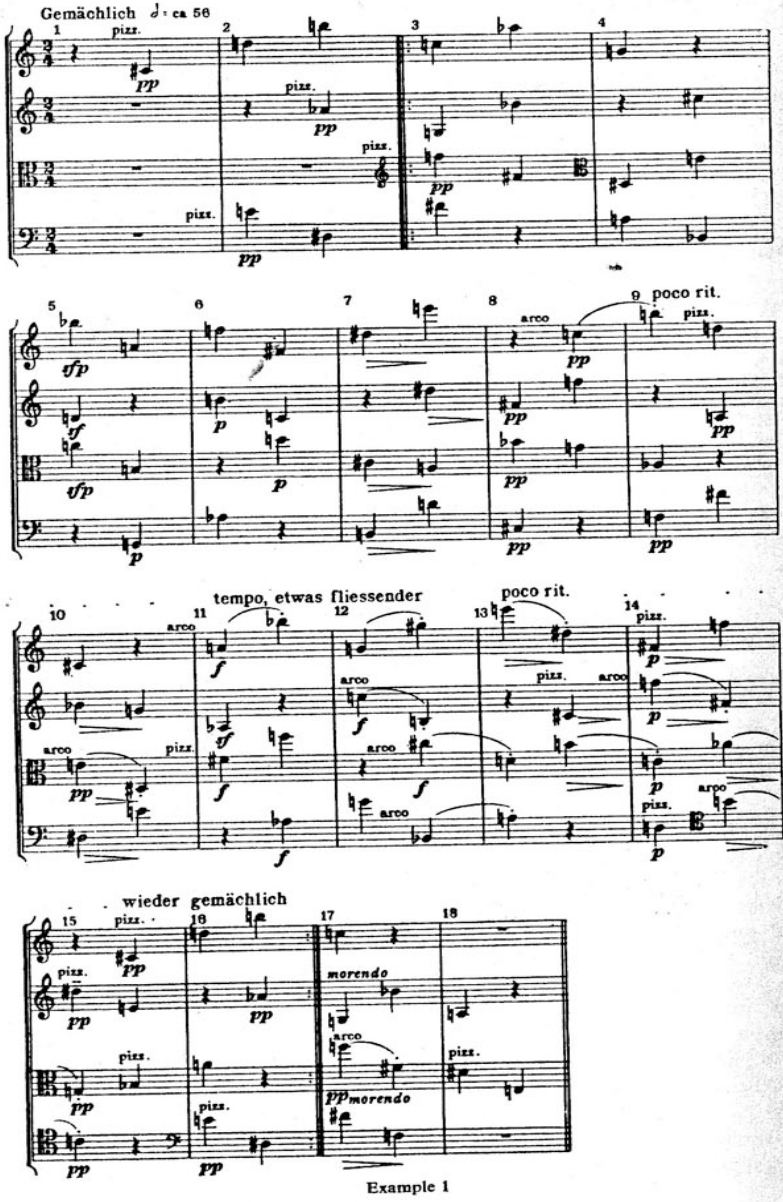
This is how we always react to Webern's music, and we would attempt to find in the structure some partial explanation for it.

Let us take a simple example: the first section from the second movement of the *String Quartet*, Op. 28. (Example 1.)

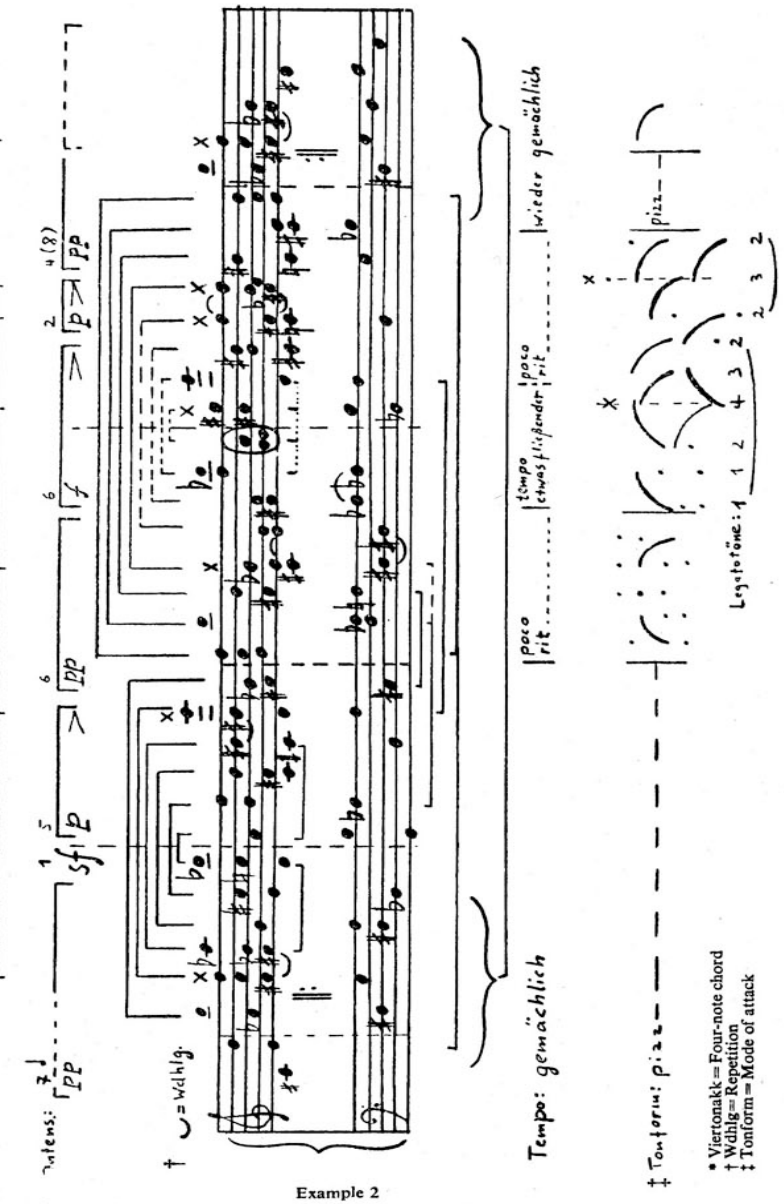
We hear a succession of thirty-five equal *time-intervals*. The distance between the individual processes of alteration thus remains constant. But after the first movement, in which the time-values are varied a good deal, we do not expect this unbroken succession of equal time-values, and the expectation of an alteration of note-value continues until the end of the section, so that the experiential time accelerates until roughly the middle and then slows down again: the intensity with which we expect a different time-value grows, then decreases. Thus in this case the constant repetition of equal time-values produces surprise, because of what has gone before. With the further repetition of the whole process this momentum of surprise falls away (though the repetition already acts as a preparation for the succeeding structure, a fact we do not know at a first hearing; as soon as we know the piece well, or by heart, our expectation covers more and more other things; finally we know everything in advance and the only alterations we notice are those in performance, etc., but fortunately this seldom happens, since one's memory can hardly retain every detail of a piece). The whole process we have described lasts hardly more than half a minute, and in none of his works did Webern go beyond this duration for the complete constancy of a parameter (in this case durations and intervals-of-entry).

When one parameter is constant, our attention is directed more toward the other processes; after 14 crotchets, all played *pizzicato*, the first *legato* occurs (in the first violin). Two crotchets later the second follows (in the viola) and the *legato*-groups become ever denser, to balance the decrease in their momentum of surprise; they die away again and lead back to the *pizzicato*. Thus the *mode of attack* participates in the time-moulding process.

A further criterion for experiential time is here the *vertical density*. Of 31 simultaneities (not counting the repeat) 23 are of three notes, 6 of four notes, and at the beginning stand a single note and a diad. The six four-note chords are so distributed that in the context of three-note chords they have a high degree of alteration: from each



Example 1



Example 2

four-note chord to the next, the three-note chords are collected to form *supra-ordered intervals* of experiential time, the intervals growing steadily shorter, then longer again. Starting at the double bar we hear the time intervals 9–5–5–3–1–3–5 crotchets.

The repeat provides a double opportunity to follow the processes of alteration: if the first time we took more notice of the alterations in attack (*pizzicato-legato*) our attention now automatically turns more to the noticeable alterations in chord-density as related to the alterations of attack (and vice versa).

Here it is already apparent that the music's *density of alteration* does not change in direct proportion to the *density of experience*. For example, if the time intervals between the alterations remain constant, experiential time becomes progressively slower; if the temporal density of alteration increases, the flow of experiential time remains for the moment constant, and its tempo increases only when the degree of alteration increases in potential. Consequently if experiential time is to pass at a constant speed when the degree of alteration remains constant, the temporal density of the alterations must increase; vice versa: if when the density of alteration remains constant the degree of experience is to remain the same, so that experiential time is to pass no more slowly, then the degree of alteration must increase. We find both processes in the example we have chosen. We see that when the individual chords come in (mensurally) even succession, Webern constantly alters the experiential time through supra-ordered processes of alteration; and we see how he does it.

The time interval between equivalent alterations of the same degree (juxtaposition of four- and three-note chords) decreases and then more quickly increases; i.e. while the degree of alteration remains constant, the time-density increases and decreases again.

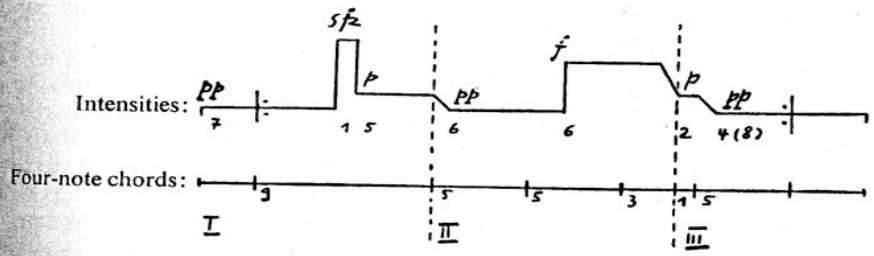
Here the *legato* attack has a much higher degree of alteration than have the four-note chords, since it is introduced only after 14 *pizzicato* attacks, and one is already paying less attention to the mode of attack, which up till then has remained constant; the juxtaposition of three- and four-note chords, on the other hand, has been experienced from the very outset of the piece as a momentum of alteration. On this account the density of the alterations from *pizzicato* to *legato* increases much more quickly in order to attain the same level of information. The time-gap in crotchets is 3–2–2–1–1–1–1–1–2 (though the last number is 5 when the repeat is played), and when, through the five-fold occurrence of a gap of one crotchet between the entries of the *legato*-pairs, the density becomes constant, the degree of alteration increases in the vertical dimension: more *legato* notes are heard at once, the serial succession being $\overset{2\text{–}4\text{–}3\text{–}2\ /\ 2\text{–}3\text{–}2.}{forte > piano >}$ Thus Webern here allows the degree of alteration to increase while the density of alteration remains constant. The experiential time of the whole section, as far as it already emerges from these two partial processes, proceeds by leap until bar 14, accelerating: moreover, from then on it becomes only slightly slower, since the density of alteration and the degree of alteration decrease more quickly than they increased, this itself constituting an alteration that counteracts the repetition of *pizzicato* notes and the greater time-intervals between the four-note chords.

In the *repeat* that follows, the curve of experiential time must thus follow a quite different path: degrees of alteration are noticed in processes that previously were less observed; memory enters as a factor that noticeably diminishes the information content of what is heard: one attempts to recognise things, the degree of surprise sinks, etc.

But in a structure the degrees of alteration and density of alteration result from the joint effect of *all components*, like vectorial values in a multi-dimensional field.

Having investigated the internal time intervals, the supra-ordered alterations of attack and the variable density of chords, let us now look at our example to see how far experiential time is determined also by the structuring of *intensities* and *harmonic alterations*. To this end, one should compare examples 2 and 3.

Alterations in loudness split up the crotchets into a number of groups:
7 *pp* – 1 *sf* – 5 *p* – 6 *pp* – 6 *f* – 2 *p* – 4 (8) *pp*.
(The repeat makes the group of four into a group of eight.) Superimposition of the two patterns of time division resulting from the groups of four-note chords and the alterations of loudness makes it clear that their points of coincidence give a new division of the experiential time into three *main groups:*



Example 3

The dynamic grouping is associated very directly with the harmonic structure. There are two harmonic mirror-symmetry groups, the first of 12 chords (6 + 6), the second of 16 (8 + 8); they arise through the mutual correspondence of chords that have a similar interval structure, based again on (vertical) mirroring, but with transposition and varying use of the octave registers. These groups are clearly divided by the introduction of *legato* attack at the exact point where the second symmetrical group begins (see Ex. 2).

The centre of the first symmetrical group is marked by a *sforzato*, that of the second by the only occurrence of a unison of two instruments and the resulting diad c'', g' *pizz.*, g' *arco* (greatest degree of alteration of vertical density: diad and four-note chord in succession). In the second group the mirror symmetry is shifted in its symmetrical balance; first by the irregularity of symmetry in the three middle pairs of chords, and secondly because the two four-note chords both occur in the second half.

The group-relationships within the symmetries are made clear through dynamics: the first half of the first mirror-group is *pp* – (2 +) 5 chords; the first chord of the central pair is *sf*; the second 5 chords are *piano*. The ensuing *pp* for 6 chords links the two symmetry-groups by drawing the last chord of the first group into the following one, and shows the exact extent of the symmetrical correspondence of chords in the second group; in the context of low dynamic levels, the *f* with high degree of alteration, like the *sf* in the first group, characterises the increasing asymmetry of correspondence in the three middle pairs; the two four-note chords are *p*; while the last symmetrically corresponding group is again *pp*.

This process is made still clearer by the handling of *tempo-alteration:* in the first symmetry-group there is no tempo-alteration; the moment the second group begins there is a *poco rit.;* with the irregularly symmetrical middle group (*forte*) the tempo becomes '*etwas fliessender*' (*rather more flowing*); at the first chord after the moment of maximum harmonic information – which is at the same time the centre of the second symmetrical group – there is again a *poco rit.* (greatest degree-of-alteration of chord density, diad to four-note chord and moreover from the surprisingly simple interval of a fourth to a differentiated four-note chord that lacks a symmetrical or semi-symmetrical mirror-complement such as has hitherto been the rule); the greatest degree-of-alteration of horizontal density (direct succession of two four-note chords) is followed by '*wieder gemächlich*' (*tempo 1 – leisurely*).

We experience in immediate succession the highest degree of alteration and the greatest density of alteration, simultaneously with a speeding up and slowing down of the tempo and a marked dynamic alteration that applies not only to the symmetric-asymmetric displacement but to the chord structure.

Here again there is a correspondence with the *legato* attack, which, together with the intervals' pitch-direction (see below) supplements the other forms of alteration. The first 5 chords of the second mirror-symmetry constitute a symmetrical group (rising *legato pizzicato*, falling *legato* ; then there is a group of six whose symmetry is telescoped: this group shifts the centre of gravity to the second half; then a group of three, linked to the previous one, with only falling *legato* bowings .

At the centre of both the group of six and the group of three, the greatest degree-of-alteration in the vertical superimposition of *legato* phrases coincides with the four-note chords marked X in Ex. 2. The latter are again differentiated by the compass (widest and closest possible) of the notes they contain:

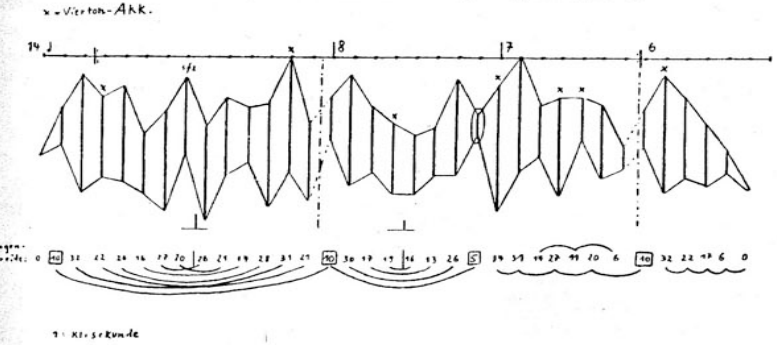
g♯″	f″
c♯″	b′
b	a♭′
B♭	f♯′

Summarising, we find the following: the harmonic symmetry-groups divide the flow of time into two sections (or, including the repeat, four plus an asymmetrical closing group), their length being (2 +) 12 and 16 crotchets. Whereas the first symmetry, whose dynamics accentuate its two halves and its centre, is *binary and regular*, the second and longer one is with regard to harmony, dynamics and tempo-alterations *ternary* and in its middle section *irregular*, with a *transference of weight* to the second half through the two 'out-of-step' four-note chords and the insertion of unequal *legato* symmetry-groups. The *separation* of the two major symmetries, effected by the introduction of the *legato*, is made *indistinct* by the taking-over of the last chord of the first group into the second, *pp*.

Whenever a slowing-up of the experiential time occurs because of a *lower degree of alteration in one parameter*, or through a repetition, the *degree of alteration in another* increases, in order, as it were, to catch up: the immediate repetition of a chord-structure in the middle of the first symmetry-group is linked with a *sforzato*; when in the symmetrically corresponding second half the various successive chords of the first half are repeated in reverse order and vertically mirrored, the intensity rises to *piano*; the second group is, with regard to its symmetrical structure, a repetition of the first, but is longer,

ternary, and irregular toward the middle – the centre, while remaining clearly marked, is no longer the point of balance, although it is precisely this group of chords that, on the analogy of the first symmetrical group, we expect to be most directly interrelated. Finally the *symmetrical part-structures* produce an *unsymmetrical overall form.*

Serialism in the succession of the intervals between the chords' highest and lowest notes is dependent on their *registers* and their *compass* (Example 4).



* *Lagenbreite = Breadth of register (measured in minor seconds)*

Example 4

Through the combination of chord-registers and compass there arises a three-fold temporal division: (1 +) 14 – 8 – 7 crotchets (with a final group of 6 after the repeat). In the first symmetrical group, chords of very similar compass correspond to one another; the middle of the group is characterised by a marked change of registers, and this is also true of the linking-passage to the following symmetry-group and from the latter to the unsymmetrical third one. The links between the groups are marked very clearly by the compass of a seventh, or its half, the fourth (10 and 5)*. The first and second group, like the third and fourth, are linked by having a chord in common, while the second and third are divided by the greatest contrast of compass (5 – 34). The first group coincides with the first harmonic symmetry-group, the second and third correspond to the two halves of the second, which, however, *differ from each other* in so far as the first is symmetrical whereas the second is unsymmetrical (decreasing in compass); the second thus has a much higher degree of alteration because of the two preceding symmetries.

A typical feature is the constant alternation within the alterations of compass – in the first group this produces two corresponding pairs which interlock 27 - 20 - 46 - 21 and in the third a two-layered series of compass-decrease:

34 - 31 - 14 - 27 - 11 - 20 - 6 - 10

After the repeat, the closing group shows a still further decrease in compass, reminiscent of a coda.

In the latter half of the second (eight-chord) group the chords in the symmetry differ by an average of four units (i.e. a major third) from those in the first half to which they correspond – this is in contrast to the first (fourteen-chord) group, where the symmetrical pairs were very closely related.

Apart from this, the *average compass* of the chords is different in the three groups, as is *the way in which their register alters:* group 1 – compass alternately increasing and decreasing, register ; group 2 – compass decreasing and increasing again, average register narrower ; group 3 – compass decreasing in alternation (see above), tending to go from the widest registers to the middle ; final group – compass decreasing, register falling .

Taken as a whole, the organisation of the chordal compass and registers thus confirms the moulding given the experiential time by the other processes of structuring; but looking closely we see that by its increasing degree of alteration it displaces the symmetrical relationship of the second half still more strongly than was up to now the case.

The combination of the instruments, and still more the structuring of absolute pitch show, moreover, that the overall distribution of notes among the registers (the register-density) places a large majority of the notes in the octave c′ – b′ – and as the outer registers of the total compass (three octaves and a major sixth) are approached, there are steadily fewer notes. The 106 notes are distributed as follows:

c‴– b‴	2
c″ – b″	29
c′ – b′	46
c – b	25
C – B	4

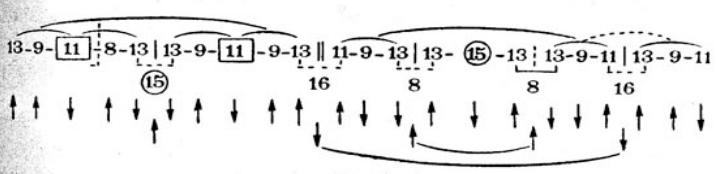
One can see from the register-diagram (Ex. 4) to what an extent the *average note-density* is in the course of this section displaced toward the middle register (with a rising 'stepwise' motion of the lower extremities while the upper extremities remain constant).

A process usually very important for the time-moulding in Webern's music is the fixing of each note in a constant octave-register, and alternation of registers at the most varying speeds; this is one of the most notable means of moulding experiential time, but there is in our example only a slight trace of it, as in this case it would not accord with the harmonic intentions. For the same reason the durations and the intervals of entry remain undifferentiated, though usually they are composed with the most varied alteration (through fixing, omission and the addition of single time-value groups for particular parts) and with the greatest variety of degrees and densities, which combine to give a quicker or slower rate of alteration.

Note-repetitions occur only before or after the four-note chords, and point out the direction of the symmetry: in the first group, f♯′ is repeated after the first four-note chord and d♯″ before the second; in the second group, two notes each are repeated: after the first four-note chord e′, d♯, and before the last of the group f♯′ and f″ (anticipation).

The hold-up caused by these repetitions draws our especial attention to the four-note chords; moreover the note-repetition adds to each four-note chord the preceding or following three-note one, thus making a composite chord of 6 notes (2 × 3) – or in the second section only 5 – as if to balance the alteration of density that is setting in. As pointers, these note-repetitions give us an insight into the subtlest refinements of Webern's technique of composition (punctuation marks).

Horizontal interval-groups in the individual instruments are always divided by crotchet rests; there is a double canon between the first violin and viola and the cello and second violin (basic series and its transposition to the upper third, retrograde form and its inversion at the fifth above). In the first violin the succession of groups (in crotchets) is:
6 – 6 – 4 (2 *arco* + 2 *pizz*) – 8 (6 *arco* + 2 *pizz*) – 6 (4 in the repeat).
The groups differ in the *type* and *direction* of intervals used within the groups – minor tenths, major sevenths, major sixths, minor sixths and minor tenths; in the joins between the groups, minor tenths, major tenths and minor sixths (see Ex. 1 above). The groups are composed as follows:

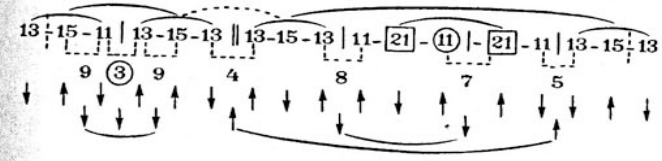


Example 5

Here too we find a symmetrical grouping – corresponding with all the others. But in contrast to the lay-out of the first mirror-symmetry group by harmony, registers, etc., its centre is here shifted one crotchet nearer the beginning, and thus the group-symmetries of different origin are made to overlap by one degree, like two grids (one is reminded directly of a picture of an object taken with a multiple exposure, so that all the contours, shifted a little one way, can be seen more than once). The linking-points of the groups, until now clear and variously emphasised, are thus made indistinct. The second group, which by harmony, register etc. has mirror-symmetry, has here axial symmetry (centre 15); the second note of the *one* largest interval (minor tenth) falls on the first chord of the harmonic *central pair*, the diad c″– g′, g′. Thus the second symmetry-groups again overlap by a crotchet. The interval-groups of the viola, corresponding vertically and symmetrically to those of the first violin (inversion of intervals) should also be examined.

In the cello we hear the group-succession (in crotchets); 3–2–2–3 | –4–4 (2 *pizz.* + 1 *arco*) – 3 (1 *pizz.* + 2 *arco*) – 3 (4). Within the groups the intervals used are minor tenths, minor tenths, major sevenths, major thirteenths (octave plus major sixth); the linking intervals between the groups are major sixths, minor thirds, major thirds, minor sixths and fifths.

Intervals and directions are related as follows:



Example 6

The first symmetry-group of 6 intervals (irregular in its central pair 11–13) is abbreviated in comparison with the first violin's first group (10=5+5 intervals) because of the

canonically delayed entry on which, however, the abbreviation of the second half also reacts. In the centre of this group (crotchet rest) there falls the *sf*, which in the harmonic group marked the first chord of the central pair; and in the following major group of 11 intervals arranged in axial symmetry (centre 11), the largest intervals (13ths) fall first on the second chord of the central pair of the second harmonic symmetry, and then on the two four-note chords that shift the centre of gravity. Thus the overlap and mutual blurring of the second *horizontal* symmetry-group (intervals and directions) and the corresponding *harmonic* symmetry-group is made one crotchet greater than in the first group. One should follow the course of the second violin similarly.

Thus we see how symmetries of the most various origin and form, occurring simultaneously and moulding the flow of experiential time, must be brought together before they fulfil their true function, that of coinciding only approximately and thus introducing into the work a variable degree of indistinctness such as is typical of any symmetry that occurs naturally.

What is like becomes only approximately like; correspondences only correspond approximately. There is thus introduced into experiential time a lastingly effective factor of alteration which at the outset of our investigations we outlined in general terms as a *desideratum:* that our expectations should be aroused through a logic of structural processes, one that can be experienced at the time, in advance and (as our example showed) still more in retrospect (since what has preceded reveals itself only through what follows, a reversal of causality); once our expectations are aroused, we are in a condition to assimilate information, and are thus provided with aural 'rules': only then do the ensuing displacements and effective alterations surprise us and to the corresponding degree give us information.

Along this narrow traverse between too much correspondence, repetition, and too much 'contrast' – i.e. too little retrospective logic: along this razor's edge the composer must be able to progress, if, starting from structure, he is to achieve mastery of experiential time, if he is to form his structure through experiential time. We no longer hear 'separate overlapping' structures, such as have been presented in isolation in this study; we do not experience simultaneous temporal processes, what we experience is *time, which is always more than the sum of quantitative alterations, since the essential factor remains indeterminable: the person who experiences.* Thus the ultimate possible creative control of structural qualities consists in the '*listening through*' that Webern always demanded.

Should a special dispensation be granted the composer – who for all his determining of individual details must hold fast to his aural conception of a complete, pre-experienced time-organism – then his art has received that indispensable essence that alone gives sense to 'structure'; and we are coming to realise the dreamlike certainty with which Webern accomplished this, starting from ever different premises and with ever different means.

If one now hears this excerpt from the String Quartet – however many times one has heard it before – everything seems 'simple', everything forms a whole, a unity. The multiplicity is welded together: it becomes *time experienced through sound: it becomes music.*

ANALYSIS OF THE SACRED SONG, OP. 15 No. 4

HEINZ-KLAUS METZGER

The text:

Mein Weg geht jetzt vorüber,
o Welt, was acht' ich dein;
der Himmel ist mir lieber,
da muss ich fahren ein.

Mich nicht zu sehr beladen,
weil ich wegfertig bin,
in Gottes Fried und Gnaden,
fahr' ich mit Freud' dahin.

is taken as the basis of a musical form in so far as to its eight lines there correspond eight mutually-related formal sections. Its articulation has accordingly been conceived in the categories of antecedent and consequent.

Line 1 – Section 1 (bars 1–2) – Antecedent	} Antecedent	} Antecedent		
„ 2 – „ 2 („ 2–4) – Consequent				
„ 3 – „ 3 („ 4–6) – Antecedent	} Consequent			
„ 4 – „ 4 („ 6–8) – Consequent				
„ 5 – „ 5 („ 8–9) – Antecedent	} Antecedent	} Consequent		
„ 6 – „ 6 (bar 10) – Consequent				
„ 7 – „ 7 (bars 10–12) – Antecedent	} Consequent			
„ 8 – „ 8 („ 12–13) – Consequent				

We need hardly demonstrate separately to how great an extent this arrangement results from the desire to make articulate the sense of the text, whose division into lines corresponds, moreover, to its syntactical divisions. The punctuation of the musical form is based on that of the text; but respirations, not made explicit in print, are also composed into the music (e.g. the rest succeeding the word *Himmel* in bar 5, or the declamation in bars 6–7); such expressive silences, which do not mark a caesura, are in Webern always to be considered, like notes, as 'values' within a rhythmic complex. From this example we can observe that expression and construction are identical, and that to oppose them to each other (that stock-in-trade of certain critics) is futile. Admittedly this lay-out, determined by the text, is applied literally to only the vocal part, is in fact conceived in terms of it, so that, from the point of view of the performance of a text the simultaneous parts for flute and clarinet can well be characterised as carrying out 'accompanying' – preparatory and interpolatory – functions, of which the latter in particular assumes importance when there are pauses in the vocal line – a division of labour familiar in the *Lied* tradition. But just through this the parts are given a periodicity that is displaced and overlaps with itself, and which determines the area within which a real interplay of three parts may be produced. In other words; in a song the vocal part, as the one concerned with the text, is made specially responsible for the meaning of the whole