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 cannot 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 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 no longer expect 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 repetition) the more fact that the alterations coincide with our expectations, the less time the senses need to react, so that great 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 sort of expectation, as the 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
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 the degree of alteration remains constant the degree of experiential time 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 (mesurally) 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 as the piece as a moment 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 (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 forte > piano > forte. 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 recognize 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:

\[ \begin{align*}
7pp & = 1sf - 5p - 6pp - 6f - 2p - 4(8)pp.
\end{align*} \]

(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:

![Diagram](https://via.placeholder.com/150)

**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 \( (8+8) \); 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 sforzando, that of the second by the only occurrence of a unison of two instruments and the resulting diad \( c' \), \( g' \) pizz., forte (greatest degree of alteration of vertical density: diad and four-note chord in succession). In the second group the mirroring 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 \( p \). The ensuing \( pp \) for 6 chords links the two mirror-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 \( f \) in the first group, characterizes 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 flussernder’ (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 semisymmetrical mirror-complement such as has hitherto been the rule); the greatest degree-of-alternation of horizontal density (direct succession of two four-note chords) is followed by ‘wieder gemässlich’ (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 symmetrical-asymmetrical 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: \( \text{C} \text{ F} \text{ A} \text{ D} \text{ G} \text{ B} \); 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:

\[
\begin{align*}
G^\# & f' \\
C^\# & b' \\
b & ab' \\
b & Bb \\
\end{align*}
\]

Summarising, we find the following: the harmonic symmetry-groups divide the flow of time into two sections (or, including the repeat, four sections, four preserves the compass group), their length being \(2+1\) 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 its middle section irregular, with a transference of weight to the second half through the way ‘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, \( \text{pp} \).

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 symmetrially 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, 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).

Through the combination of chord-registers and compass there arises a three-fold temporal division: \(1+1\) 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 the case 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 \(32\text{-}31\text{-}30\text{-}29\text{-}27\text{-}26\text{-}3\) and in the third a two-layered series of compass-decrease:

\[
\begin{align*}
\text{p} & \text{pp} \\
35 & 31 \text{—} 14 \text{—} 27 \text{—} 31 \text{—} 29 \text{—} 6 \text{—} 10 \\
\end{align*}
\]

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 and 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:

<table>
<thead>
<tr>
<th>c''''</th>
<th>b'''</th>
<th>2</th>
</tr>
</thead>
<tbody>
<tr>
<td>c''</td>
<td>b''</td>
<td>29</td>
</tr>
<tr>
<td>c'</td>
<td>b'</td>
<td>46</td>
</tr>
<tr>
<td>c</td>
<td>b</td>
<td>25</td>
</tr>
<tr>
<td>C</td>
<td>B</td>
<td>4</td>
</tr>
</tbody>
</table>

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 e'' (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 x 3) - or in the second section only 5 - as it to balance the alteration of density that is setting in. As repetitions, 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 lines, there is a double canon between the first violin and viola and the cello and second viola (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:

\[ 1 - 6 - 4 (2 \text{ arco} + 2 \text{ pizz}) - 8 (6 \text{ arco} + 2 \text{ pizz}) - 6 (4 \text{ in the repeat}) \]

The groups differ in the type and direction of intervals used within the groups - minor thirds, major sevenths, major sixths, minor sixths and minor tenths; in the joins between groups, major tenths, major tenths and minor sixths (see Ex. 1 above). The groups are composed as follows:

![Example 5](image)

In the cello we hear the group-succession (in crotchets); 3-2-2-3 | 4-4 (2 pizz. + arco) | 3 (1 pizz. + 2 arco) - 3 (4). Within the groups the intervals used are minor thirds, minor tenths, major sevenths, major sixteens (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](image)

The first symmetry-group of 6 intervals (irregular in its central pair) is abbreviated 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 (crotchets rest) there falls the A, which in the harmonic group marked the first chord of the central pair; and in the following major group of II intervals arranged in axial symmetry (centre I), 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 crotchets greater than in the first group. One should follow the course of the second violins 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 fulfill 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 altercation 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’ by which then do the ensuing displacements and effective alterations surprise us and 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 indeterminate: 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 determination of individual details must hold fast to his aural conception of a complete, present experience 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.