

## MUSIC AND PATTERN<sup>1</sup>)

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1. A musical analysis which is semiologically inspired will aim an explicit and exact examination more or less after the manner of the natural sciences. But this can be done in several ways. In the attempts which have been made heretofore there would seem to be two opposing approaches. One can take as a point of departure the music's "smallest particles" and associate the demand for exactness with statistical and computeristic ways of thinking, or one can start from the opposite end in the work's entirety *e.g.* with a comparative use of mathematical models. Between the two approaches, atomistic and holistic, this attempt, if it succeeds, should take its place on the holistic side.

2. The analysis of music must accept that music is made up of units or elements, and it would seem obvious to take this as a starting-point, were it not for the fact that it is not so obvious what is to be understood by these units. One could, for example, regard formal units as being of three kinds:

- the *smallest* units, *i.e.* tones, sounds, durations, chords, etc.
- units which are determined by their place in the musical *context e.g.* ornament, passing tone, suspension, organ point, contrary motion, subdominant etc.
- units which have the character of *lesser wholes*, with more or less clearly defined functions in the overall structure, *e.g.* cell, motive, period, theme, exposition, etc.

The *smallest* units are not so difficult to define but an analysis based on them alone does not lead us far. It would be atomistic in the extreme and would not be able to tell us much about what happens in the music. As regards the other two categories, we are confronted by a considerable job of clarification before such units can be used analytically with any confidence and it is therefore not surprising that investigators whose aim is a musical semiology give the problem of defining the elements of music a central place<sup>2</sup>).

3. However, it seems a bit hard to deny oneself the possibility of discussing with others the things one hears in music — and which one regards as being of importance for the pursuit of the formal ideas therein contained — until the work of defining the units and signs has been concluded. On the contrary, the thinking of such "unauthorized" thoughts and the communication of them to others must be regarded as a necessary part of such a process of definition. In the research done in the language media brilliant and inspiring contributions have been made with regard to such things as narrative structure in spite of the fact that investigations of syntactic, and especially of semantic problems, and the delimitation of linguistic elements cannot yet be said to have achieved complete clarification.

4. It seems obvious in this connection to take the *pattern* rather than the *unit* as the point of departure for a musical analysis. A pattern is in itself the expression of a relationship and its existence is therefore *a priori* well-established. The pattern has furthermore another advantage as the basis for analysis, namely that its abstract nature can be generally recognized, something which might cause difficulty to some in the case of the unit.

It is advisable here to distinguish between two meanings of the word pattern:

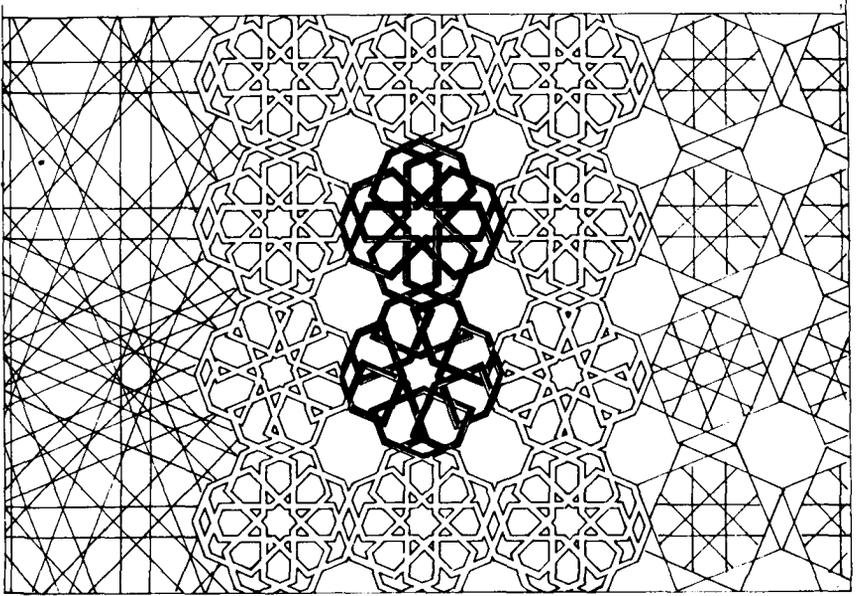
- a. a pattern as a whole, the characteristics of which are repetition and symmetry, hence ornamental design (cf. "overall pattern", or the adjective "figured").
- b. a pattern as a structure of tradition, a model, an example (cf. "exemplary", "registered pattern"). Such examples in music are the suspended fourth, the tonal cadence, the canonic principle, etc.

I will call the first *symmetry-pattern* and the second *tradition-pattern*.

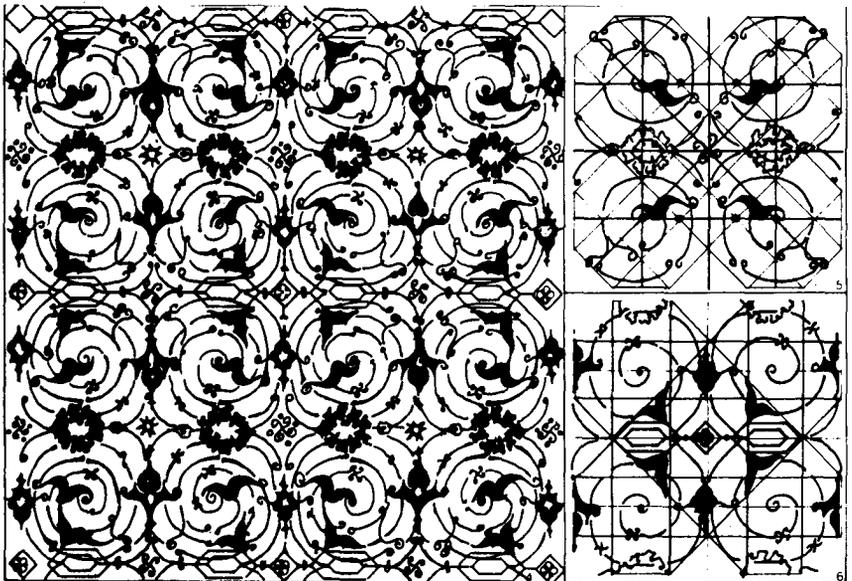
Both meanings of "pattern" are of the greatest relevance to musical composition and it seems to me that an analysis which thoroughly investigated a composer's treatment of pattern, in both meanings of the word, in a given piece of music would go a long way towards an understanding of its form. However, it must be admitted that the *tradition-patterns* in music are made up of a complex of tonal, rhythmic, melodic and other devices which more or less correspond to, and give rise to, the same problems of definition as what we called units above (point 2).

With regard to the *symmetry-patterns* on the other hand, insofar as they occur, they appear as self-assertive entities in the individual works. These, therefore, provide the most suitable material for an analysis which wishes to limit as much as possible the number of unclarified assumptions underlying its own activity.

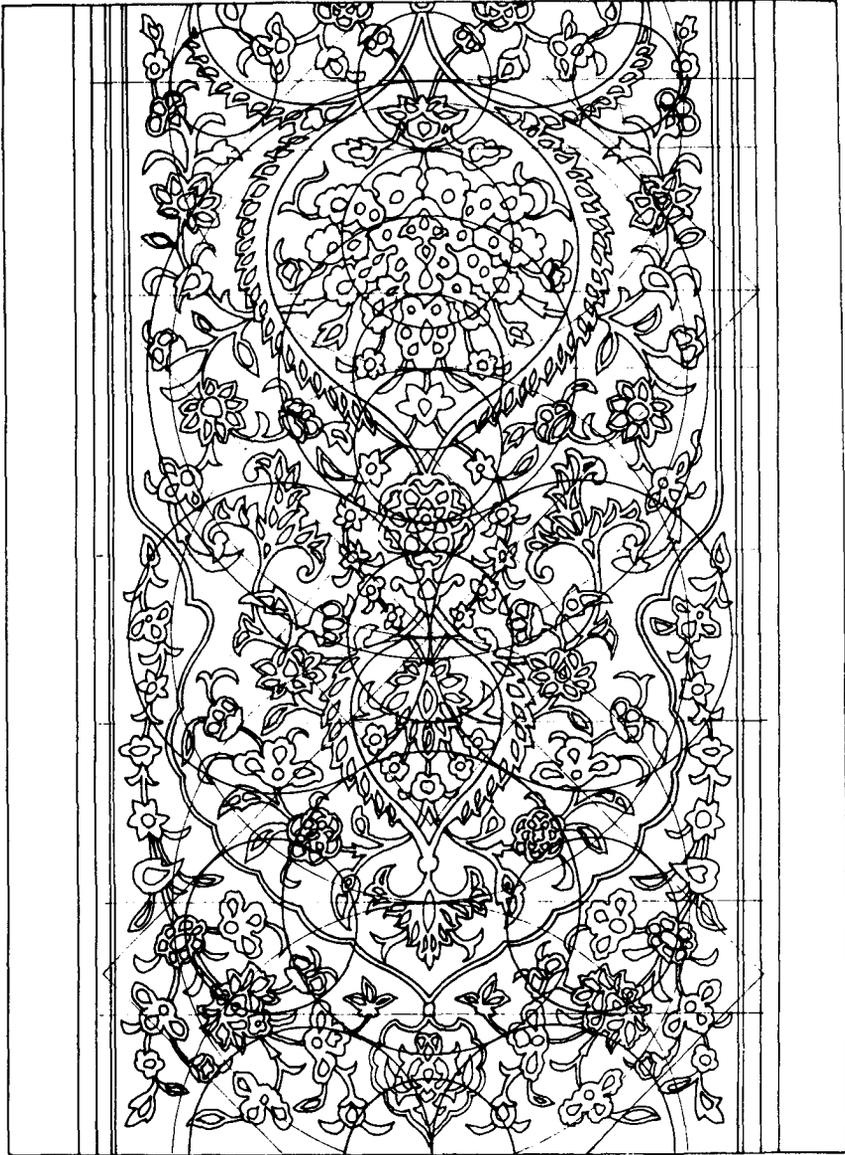
5. An attempt at analysis of visual patterns<sup>3</sup>) can provide a considerable inspiration for such an approach.



Ex. 1. (Exx. 1-3: Copyright 1974 by Thames and Hudson, London. Used by permission).



Ex. 2



Ex. 3

Above are three analyses taken from a book on Islamic patterns<sup>4</sup>). The examples demonstrate some of the traits in ornamental patterns which I could imagine looking for transferred to a musical analysis.

a. In its typical form (Exx. 1, 2) the manifest pattern is only a part of a potential pattern of infinite repetition. At the same time the manifest pattern con-

tains enough information so that we can construct as much of the infinite structure as we may want. In other words, the manifest pattern represents an infinite.

b. That fact alone, that a pattern is an entity based on symmetry and repetition, is the same as saying that behind a pattern (*i.e.* as a prerequisite for it) is a — visible or invisible — *framework* of lines of connection — or construction. The analysis of such a pattern becomes therefore very much a *reconstruction* of this *framework*, a construction of geometrical figures (straight lines, circles, triangles, spirals, etc.) which cross each other and circumscribe the details of the pattern in such a way as to expose its structure.

c. With this *framework* as starting-point we can now trace the artist's work, in the form that we have it, in two directions: the one is most clearly demonstrated by Ex. 3. We see a wealth of detail, of windings, leaves and flowers, — in other words, there is a great deal of elaboration in relation to the supporting *framework* (which, as shown in the example, an attempt has been made to reconstruct). Something similar applies to Ex. 2, whereas the elaboration in Ex. 1 is not so manifold. We will call this elaboration the pattern's *execution*.

But the artist can also undertake alterations in the supporting layer itself, in the *framework*. The pattern of Ex. 1 is an example of this. At first glance it appears to be a simple repetition pattern, built up of regular octahedra (the lines of construction of the analysis can be seen to right and to left of the pattern). But on closer examination we see that the third horizontal row of octahedra has a quite different structure than the others. Here we are clearly confronted with an alteration in the basic structure of the pattern itself in relation to the surrounding pattern. We will call such a basic alteration an *intervention* in the pattern.

It ought to be pointed out that what we, who seek to uncover these things, will consider as *execution* of a pattern and *intervention* in it respectively, depends on what we regard as — or choose to regard as — the supporting *framework*.

6. We will now try to approach musical design in a similar way. As a test piece I have chosen "Intermezzo II" from Robert Schumann's *Kreisleriana*. I must therefore ask the reader, before he goes any further, to provide himself with a copy of the music. It should be emphasized that the following is not, nor does it try to be, a complete formal analysis of the piece. All that is intended is an investigation of *symmetry-pattern* in the composition while the presence in it of, for example, tonal, rhythmic and harmonic features of *tradition-pattern* will deliberately be ignored.

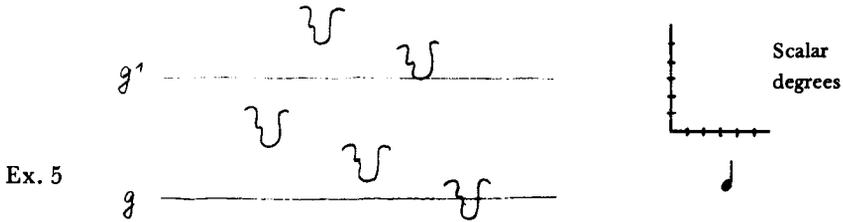
Ex. 4 shows the bare upper voice of the first five bars.



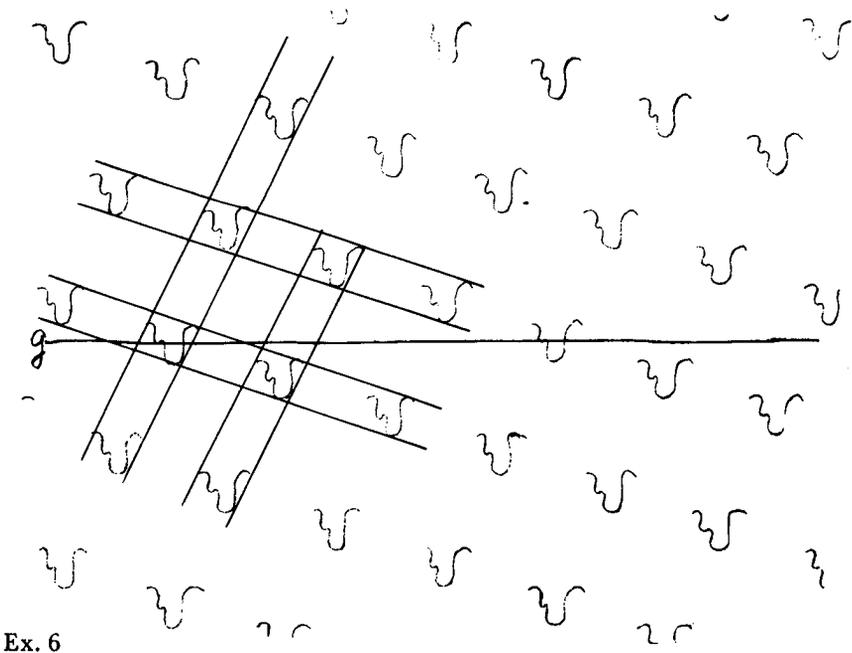
Ex. 4

I have tried now (Ex. 5) to make a delineation of this. The music is drawn in a system of coordinates of which the horizontal axis is the music's time-axis (the unit is the crotchet) and the vertical axis represents the pitch (the unit is the diatonic scalar degree). The scale of reference is shown.

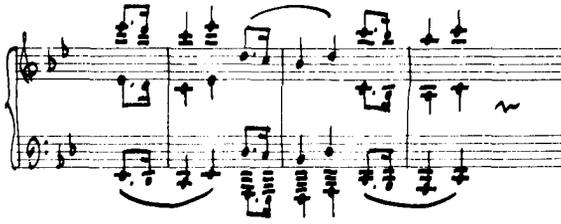
In addition, for purposes of orientation, the note G is entered as an horizontal line. To help make things clearer, instead of representing the music as one continuous curve, I have split it up into five smaller figures — in doing which, incidentally, I follow Schumann's phrasing.



It is now apparent that these five quantities<sup>5</sup>) together define an infinite pattern which they thereby represent:



A comparable, more comprehensive representation of the pattern in notes would look like this:



Ex. 7

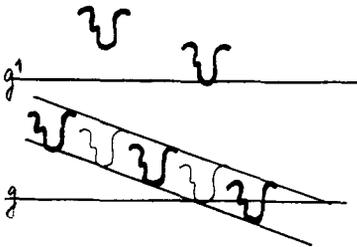
This pattern can therefore be derived directly from Schumann's notes as a more general system underlying the music's apparent course. The pattern can be analyzed by means of two sets of parallel lines which cross each other (see Ex. 6). These lines move, from the point of view of the music's time-factor, respectively sharply rising and gently falling.

At this point we will introduce as a condition a principle which is familiar from traditional musical analysis but which is new here, namely, the composer's liberty to make use of a redistribution of material at the octave in his *execution* for the instrument of the pattern.

This principle, in fact, makes possible a considerable simplification of the example inasmuch as, by introducing such octave transpositions in a kind of "shadow version", we can bring the whole design back to one simple gently falling movement. By doing this we have given preference in our consideration to this gently falling, rather than to the sharply rising movement (Exx. 8 and 9).



Ex. 8

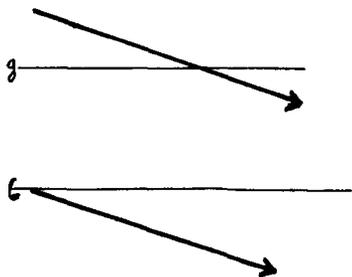


Ex. 9

This preference, moreover, receives indirect support from another principle which is also known from traditional musical analysis (but which it is not necessary to introduce as a condition here), since the fact that the falling movement in Exx. 8 and 9 repeats its figure on each diatonic step makes it an example of the important role of stepwise movement as a supporting beam of musical logic.

If we now look at the movement of the bass, we see that it describes a pattern which proceeds parallel to the falling movement of the upper part, thus lending further support to our impression that this is the main direction. But not only does the bass part move parallel to the fall of the upper voice, it will now be argued that the pattern of the two parts originates basically in the same idea, only the *execution* of the pattern is different in each case.

If we say that the gentle fall is the main direction of movement in both upper and lower parts, then our point of departure is two parallel lines with this fall:



Ex. 10

And the actual working out can be explained through the following steps:

a. a circulating four-note idea is assigned to both lines as a figure to be repeated on each diatonic step. There is a little displacement in time between the figures in the two voices (so that they agree with the traditional laws of harmony):



Ex. 11

b. this repeating figure is assigned to a concept of ordered time (in 3/4) which at the same time results in a movement with sharp dissonances:



Ex. 12

c. in both parts the periods of repetition are now made double so long so that they become of two bars length. But from here on the *execution* of the pattern

follows different lines of direction above and below. In the upper part, as we saw, this is done by every second figure being set an octave up. In the lower part it is done by contracting two figures of repetition into one by the omission of two notes (see Ex. 13; the omitted notes are indicated by asterisks). The contraction is furthermore supported by a corresponding phrasing.

Ex. 13

d. finally, in Schumann's complete *execution* of the pattern, the tonal and pianistic factors which condition such things as the occurrence of chromatic alterations in both parts and the elaborate semiquaver movement in the upper part appear. We will not go further with this side of things since it relates back to the *tradition-patterns*. Nevertheless, it is apparent that the chromatic shift between F sharp and F (bars 1, 3, 5) emphasizes the shaping of periods into repetition-structures of two bars<sup>6</sup>).

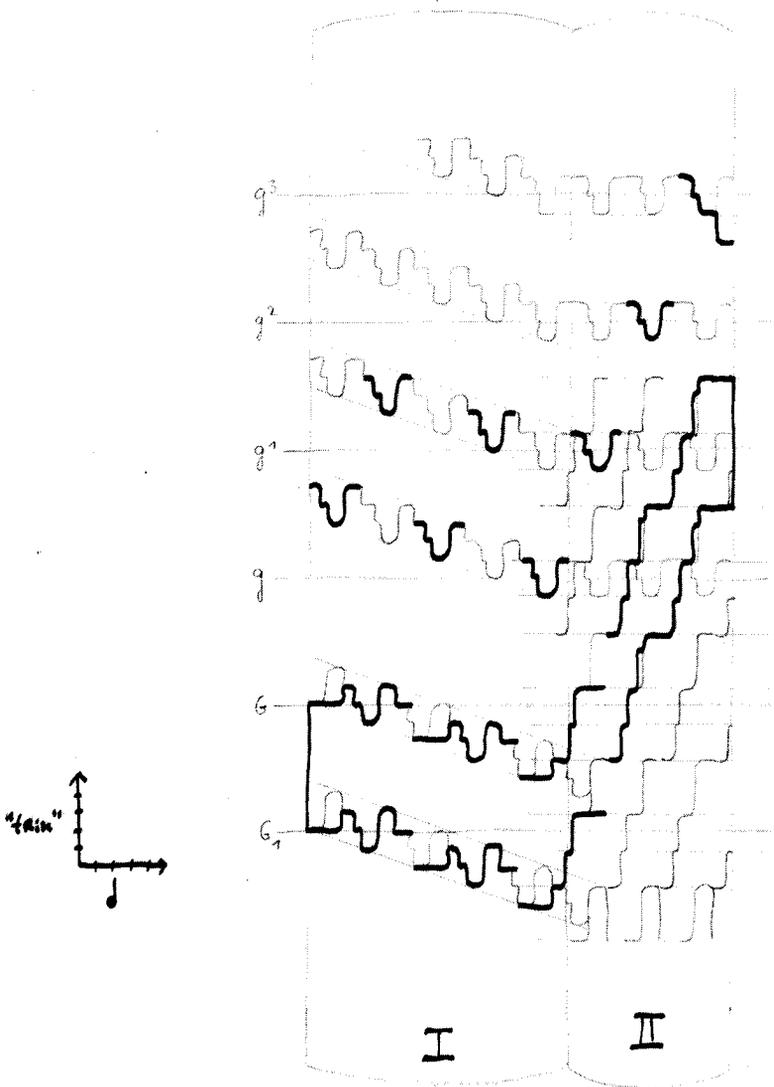
To help with an understanding of the above it should be emphasized that I do not mean my presentation to imply that Schumann – consciously or unconsciously – proceeded by way of just these steps. This is an analysis of the music's internal logic and not a psychological investigation of the compositional process.

7. I have gone into a good deal of detail in the discussion of these first few bars in order to demonstrate as well as possible the principle that it is attempted to carry through. So thorough a presentation is hardly necessary for that which follows.

The movement which has been described could now have continued in accordance with the pattern that has been laid out:

Ex. 14

but at the asterisk it turns off to another pattern (pattern II). Ex. 15 is a picture of the whole first part of the Schumann piece up to the repeat sign.



Ex. 15

The thin vertical line divides the picture into two areas corresponding to pattern I and II respectively. The thin line is drawn at precisely the place where *the intervention* in the first pattern can be demonstrated, *i.e.* the same place that I marked with an asterisk in Ex. 14. The new pattern may at first glance appear as an abrupt ascent through several octaves (the heavy figures in the drawing) but the very principle which we introduced above, octave transposition as a compositional possibility, enables us to look upon this abrupt rise as being governed by a static idea, shown by the light figures in Ex. 15. These light figures come into being as transpositions at the octave, up and down, of the figures which make up the manifest movement, and form a background pattern through which the motion travels. In other words, the apparent sharply rising movement can be understood as the *execution* of a static pattern which is held fast around a D major chord (cf., incidentally, the harmonic stabilization expressed in the chromatic change from E flat to E).

How does the *intervention* in pattern I in favour of pattern II take place? It is a prepared transition, namely what may be designated a transition by means of a *common figure*. It will be observed that a figure in the upper part, of nearly a whole bar's duration, belongs to both patterns, the preceding as well as the succeeding (see the enclosed notes in Ex. 14). Pattern II begins therefore nearly a bar before pattern I has played its role to completion.

As for pattern II, whilst the static background pattern repeats itself in each bar, the *execution* of it proceeds in one stretch through four bars.

The presentation of pattern II is halted now by a *general intervention*, a cadence, at which the semiquaver movement is brought to a standstill and there is a repeat sign.

8. The next six bars are the most complicated, from our point of view as well, and therefore also the most interesting. In the course of the six bars two ascending patterns, (patterns III and IV) occur in succession and both have a repetition period of one bar ( $=3/4$ ). What is especially interesting, however, is that the two patterns do not shift from pattern III to pattern IV at the same time in both voices.

Pattern II begins simultaneously in both voices and would, if there were no *intervention*, proceed something like this:



Ex. 16

The rate of ascent here is a third per bar.

However, *intervention* does occur, in the upper voice at the figure marked \*, and in the lower voice at the figure marked \*\*. At these places there is a change to a less steep ascent, namely a second per bar. It is immediately apparent therefore that the two voices must come closer to each other between \* and \*\* (from a distance of a tenth apart down to a seventh – see Ex. 17).

Ex. 17 shows a musical passage with two staves. The upper staff contains notes with figures 10, 10, 9, 8, 7, 7, 7 written below them. The lower staff contains notes with figures 10, 9, 8, 7, 7, 7 written below them. An asterisk (\*) is placed above the second bar, and two asterisks (\*\*) are placed below the sixth bar. A tilde (~) is at the end of the passage.

Ex. 17

The superseding pattern, pattern IV, looks like this in notes:

Ex. 18 shows a musical passage with two staves. The upper staff contains notes with slurs. The lower staff contains notes with slurs. A 'Con sda' marking is written below the first bar. A tilde (~) is at the end of the passage.

Ex. 18

If we allow ourselves to look at the course of the six bars as the piece of engineering it is, we can interpret the passage thus: as a point of departure the first bar and a half are given and desirable (as a clear assertion of the B<sup>7</sup> chord). The pattern of the last two bars also is given and desirable (as the passage which leads from the B<sup>7</sup> chord to the following d minor cadence). The difficulty then lies with the approximately 2½ bars which lie between (bars 10–12) – how one gets from the one situation to the other. By means of his inventive displacement of the necessary *intervention* in the upper and lower voices respectively, Schumann achieves a continuous development without a jolt and, more than that, a daring and colourful structure (in which, tonally speaking, the most characteristic feature perhaps is the octave doubling of the seventh of the B<sup>7</sup> chord, A flat, in bar 11).

But how did Schumann arrive at just these places (marked by \* and \*\* in Exx. 16 and 17), where the *interventions* occur? If, as suggested above, we regard the beginning and the ending of the six bars as given and as representing patterns III and IV respectively, we will see that the two *interventions* must logically occur where Schumann makes them since, as can be seen in Ex. 19, that is where the two patterns cross each other:



This is a graphic rendering of the whole piece after the repeat sign, consequently the six bars are only a little more than the first third. Where the *intervention* occurs in the upper and lower parts respectively is shown with thin vertical lines.

In both cases of *intervention* the transition is achieved (as from pattern I to II) by means of a *common figure* (the enclosed places in Ex. 16).

To go further with an analysis of the *execution* of these patterns, e.g. with an investigation of the harmony of the six bars, or of the tonal factors associated with the use of accidentals, falls, for reasons already mentioned, outside the scope of this article.

9. The next *intervention* occurs in bar 15. If pattern IV had continued we would have had:



Ex. 21 *Contra*

but the *intervention* takes place at the place marked by an asterisk and here there is scarcely a *common figure*. The new pattern (pattern V) with its tonally static *framework* can be compared to pattern II (see Ex. 20) but its *execution* is different. There the pattern was led through several octaves in an abrupt ascent. Here however the *execution* too is held fast on one level (with the exception of bar 19 where the octave below is taken into use) and variety is achieved by other means: rhythmic abbreviation (bars 16, 17, 19), embellishment (lower voice, bar 18) and harmonic change (d minor chord to D major chord, bar 19).



Ex. 22

In the *execution* of this pattern, then, efforts are directed towards a compression of the time factor (bars 16, 17, 19). Since this is not a typical trait of the piece we will not treat it in more detail, though one can very well imagine other pieces of music in which extensions and concentrations of the time factor are the preferred means of working out the *execution* of the design.

10. After pattern V there is a return to pattern I and the transition is accom-

plished without a *common figure*.

Pattern I is executed exactly as the first time and an *intervention* occurs exactly as in bar 5 but the *intervention* leads somewhere else. The new pattern (VI) is not static like pattern II but, on the contrary, sharply rising, a fourth per bar.

From pattern I is borrowed the feature of the upper voice shifting between two levels whilst the lower voice maintains the general direction (see Ex. 20). The upper voice continues also the idea of a two-bar repetition whilst the lower voice here goes down to a rhythmic repetition in every bar, which increases markedly the effect of mounting intensity.

The last note of the pattern is the F sharp in bar 26. The last *intervention* is the tonal cadence.

11. By limiting myself to the investigation of patterns that were *present as symmetry-patterns* in a given piece of music I have attempted to carry out a musical analysis in which I had, implicitly or explicitly, to draw upon the assumptions of traditional musical theory to only a limited extent. Where I have touched upon such assumptions in the course of my analysis it has usually been by way of reference and has not been logically necessary for the carrying out of the analysis. However, there has been one important exception; without the concept of *octave transposition* it would have been difficult to reveal the *framework* behind the *execution* of the pattern.

In return, I have introduced certain new concepts which have been determined in the course of the presentation. Such are expressions like *symmetry-pattern* as against *tradition-pattern* and, in the case of *symmetry-pattern*, a distinction between a *framework* and the theorist's *reconstruction* of it, between the *execution* of the pattern and *intervention* in it. Finally I have introduced the expression *common figure*. It seems to me that the suggested endeavour, to reveal the *symmetry-patterns* in music and to investigate how they behave in relation to each other, is worth continuing. But there is good reason to emphasize that it is by no means certain that the *graphic delineation* will be an obvious tool in every case. I have used it here as a means simply to emphasize the relationship to visual patterns, but it is conceivable that in many cases music's patterns can be better uncovered using other means.

## Notes

- 1) The material of this paper was presented at a seminar "Experiment in Musical Morphology" at the University of Copenhagen in the spring semester of 1976.
- 2) See, for example, Nicholas Ruwet, "Méthodes d'analyse en musicologie", *Revue belge de musicologie* xx (1966), 65-90.  
Morten Levy, "Sur le problème de la définition des unités musicales", *Semiotica* 15:1 (The Hague 1975, 8-27, and "Syv ord om tegnet i musikken", *Papir* 1:3 (Copenhagen 1975), 48-63.
- 3) The mathematical theory behind such analyses is the *group theory*. A pioneer in this field has made the following remarks, in which he emphasizes that which is also my subject — the obvious relationship that exists between ornamental patterns and music. He says, "in conclusion I would like to refer furthermore to the fact that the higher mathematics are not yet in a position to express all that which is mathematically conceivable in art. Especially in music many secrets remain hidden; we know, for example, very little about how Bach worked out his fugues. However, the most recent investigations by Busoni, Lorenz, Werker, Graeser, etc., have already produced remarkable results. These concern things which can be referred to by the collective name "symmetries"; to be sure, in music, which takes place in time rather than in space, they have a somewhat different character than in ornamental art, but the relationship between the two art forms is evident." (Andreas Speiser, *Die Theorie der Gruppen von endlicher Ordnung* (1922), p. 3).
- 4) Keith Albarn and others, *The Language of Pattern* (London 1974).
- 5) It may appear as if by introducing and drawing five such quantities, separated from each other, I am trying to slip the musical units in by the back way, unnoticed (cf. points 2, 3 of the discussion above). But on further consideration it becomes apparent that the precise demarcation of these quantities is not decisive for carrying out our point of view. One may observe that a series of quantities forms a pattern without it being necessary to determine more precisely the nature of these quantities.
- 6) Schumann's *execution* of the stepwise descent of the first five bars appears as an internal pattern in this composition and it is as such that I have called attention to it. However, the relationship does not prevent this internal *symmetry-pattern*, as such, from being also a traditional formation, hence a *tradition-pattern*. As an illustration of this I offer here an example from Sebastian Bach which is closely related to Schumann's. The stepwise descent is the same, only the repeating figure unit is not a circular four-note figure in g minor but a three-note figure in d minor.



Ex. A

The *execution* of this example (from Toccata in d minor for piano) is simpler and less pianistic than Schumann's, but one can hear that the *tradition-pattern* is the same.

Notice how both *executions* close with a  $\frac{6}{2}$ -chord.



Ex. B

## RESUMÉ

Arbejdet blev fremlagt ved et seminar *Forsøg i Musikmorfologi*, forårssemesteret 1976, Københavns Universitet, og det tager udgangspunkt i en grundlæggende vanskelighed for den analyserende musikforsker: Musikteoriens udvikling giver ham (endnu) ikke noget analyse-apparat i hænde som tilstrækkelig konsekvent har afklaret sig sine forudsætninger i forhold til den musik, det skal analysere.

En vej at gå, under et evt. forsøg på at udvikle det fundament som en sådan konsistent teori kan bygges på, er at koncentrere sig om den definitoriske fastlæggelse af musikkens enkelt-elementer, enhederne, "tegnene" — og de problemer der er med det. Det er en vej af indlysende væsentlighed.

*Dette arbejdes* emne er imidlertid en argumentation for at en anden vej også må forsøges: Den at afdække, ikke *enhederne*, men *mønstrene* i musikken. Og med mønstre tænkes her ikke i første række på det jeg i fremstillingen kalder *traditionsmønstre* (dvs. "mønstre" i betydningen "forlæg") men på det som jeg kalder *symmetri-mønstre* ("mønstre" i betydningen "symmetri-mønstre er til stede metrisk gentagelses-struktur"). I det omfang sådanne symmetri-mønstre er til stede i musikken kan disse i vidt omfang — og umiddelbart — studeres på deres egne betingelser, dvs. uden inddragning af den historisk opbyggede musikteoris apparater. Vi står derfor overfor dannelser som, netop fordi de kan studeres temmelig forudsætningsløst, må udgøre et godt udgangspunkt for en musikteoretisk afklaring.

Som et musik eksempel valgte jeg et klaverstykke af Rob. Schumann. Det vistest at være lavet over seks forskellige mønstre som afløste hinanden. Schumanns musik opfattes som konkrete *udførelser* af bagved liggende mønstre som i deres natur er abstrakte og uendelige.

Det bliver undersøgt hvordan kompositionen i hvert enkelt tilfælde kommer fra det ene mønster til det næste. Mest interessant er i denne henseende nogle takter, hvor et sådant mønsterskift (fra mønster III til mønster IV) optræder flere takter senere i understemmen end i overstemmen (se exx. 16-17-18-19).

For at opnå den bedste anskuelse benytter jeg mig af grafisk afbildning, idet jeg udtrykkelig lader mig inspirere af en anden kunstart, nemlig billed-ornamentikken. Og gennem nogle analytiske betragtninger over for billed-ornamentikken (pkt. 4-5) udskiller og definerer jeg enkelte termer som kan blive nyttige i det videre arbejde med mønster-analyser af musik, og dermed med den efterlyste musikteoretiske afklaring i det hele taget.