MESSIAEN/ GOEYVAERTS, FANO/ STOCKHAUSEN, BOULEZ

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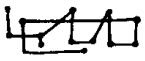

A week in politics, so the saying goes, is a long time. Even with the instant communications of McLuhan's "global village," the development of art proceeds at a less hectic pace, possibly because the cultivation of short memories is not one of its prerequisites. All the same, the postwar development of new music has unfolded at unprecedented speed, and whereas the Renaissance scholar can often accept a latitude of twenty years in dating even a work by a major master, without necessarily falsifying his or our view of musical history, this margin of possible error has gradually narrowed to the point where the required accuracy is now measured in months rather than years. Under the circumstances, it's not surprising that 20th-century musicology is an unpopular field, or that some of its exponents should already show signs of those expediently short memories.

To date, the chief victim of these lapses is the period of European music which saw the rise of electro-acoustical music and integral serialism (1948–53). A recent article by Stockhausen[1] clears the ground for an accurate study of the former; perhaps the present essay will refresh a few memories as to the origins of the latter. Briefly, the early serial phase is represented in most people's minds by three works: Messiaen's *Mode de valeurs et d'intensités* (1949), Stockhausen's *Kreuzspiel* (1951), and Boulez's first book of *Structures* (1951–52). Now in view of what was said above, two years seems a long time for a cause to produce effects, especially such disparate effects as *Kreuzspiel* and *Structures*. The facile explanation of this disparity has centered on the idea of "different creative personalities," not that Boulez's (highly evolved) personality as manifested in the 2nd Piano Sonata and *Livre pour Quatuor* bears much relation to the "personality"

[1] "The Origins of Electronic Music," *Musical Times*, July 1971.

of *Structures,* whilst Stockhausen's latest work prior to *Kreuzspiel* was a classically dodecaphonic Violin Sonatina. Occasionally one finds a reference to Goeyvaert's Sonata for 2 Pianos (1950–51),[2] but since no commentator ever ventures more than the information that the work is totally serial (which, properly speaking, it isn't), and no examples are given, the reliability of the source usually seems pretty suspect. The Sonata by Michel Fano (1951) is never mentioned at all. I shall try to show that it is precisely these two works that form the "missing link" from Messiaen's study to the above-mentioned works of Boulez and Stockhausen.

History

In 1949, at the Darmstadt Summer Course, Messiaen composed his piano study *Mode de valeurs et d'intensités,* the first European composition to apply numerical organization to pitch, duration, dynamic, and timbre (mode of attack). In 1950/51, two of Messiaen's pupils, the Belgian Karel Goeyvaerts[3] and the Frenchman Michel Fano, each composed a Sonata for 2 Pianos extending serial organization to all aspects of the individual sound. Goeyvaerts took his Sonata to Darmstadt in 1951, where he showed it to the twenty-two-year-old Karlheinz Stockhausen, whose recent Violin Sonatina had been broadcast that March by WDR Cologne, and was attending the course for the first time on the advice of Dr. Herbert Eimert. Goeyvaerts had intended to show the 2-Piano Sonata to Schoenberg, who had been engaged to direct the composition course. In the event, however, Schoenberg was gravely ill (he died on July 13th) and the course was taken over by Theodor Wiesengrund-Adorno. The second movement was performed in Adorno's class by Goeyvaerts and Stockhausen (a tape of this performance is preserved in the Archives of the I.P.E.M., Ghent). According to Heinz-Klaus Metzger,[4] Adorno's opposition was conducted on philosophical rather than musical grounds. The apparent "objectivity" of this "point" music was not to the taste of the author of *Philosophie der neuen Musik,* and his alarm at this seeming retreat from "musical expression" is clearly documented in a slightly later article, "Das Altern der neuen Musik,"[5] which mentions only Pierre Boulez as instigator of the New Objectivism (a curious nomination in view of the 2nd Piano Sonata and *Livre*), but is clearly based on Goeyvaerts'

[2] Presumably because Stockhausen himself has frequently drawn attention to the influence of Goeyvaerts on his early work (e.g., *Texte II,* p. 11).

[3] At the time of composing the Sonata, Goeyvaerts had not heard *Mode de valeurs,* since he had left Messiaen's class over a year earlier. Both he and Stockhausen first encountered the work via a disc Goléa brought to Darmstadt in 1951.

[4] H. K. Metzger, "Just Who is Growing Old?" (*Die Reihe,* No. 4).

[5] 1954, published in *Dissonanzen,* pp. 136–159 (3rd Ed.).

Sonata and his analysis of it in Adorno's class.[5a] Stockhausen, on the other hand, was impressed, and that autumn he wrote his first acknowledged work, the *Kreuzspiel* (Crossplay) for oboe, bass clarinet, piano, and percussion. Later that year at Donaueschingen, the premiere took place of Boulez's *Polyphonie X* for 18 instruments, a work which attempts to extend serial control to timbre via instrumentation, and which Stockhausen considered unsuccessful (as presumably did Boulez, since the work was withdrawn, even though certain aspects are offered as examples in "Eventuellement," an article published in 1952 in the *Revue Musicale*). In January 1952, Stockhausen traveled to Paris, where he attended Messiaen's course in analysis and aesthetics (this was the year when Messiaen concentrated on rhythmic analysis of the Mozart piano concertos, a study which bore further fruit in Stockhausen's 1960 Mozart essay). On visiting Boulez, the latter showed him the unfinished *Structures,*[6] and they discussed the most recent "point" works, i.e., *Kreuzspiel* and the sonatas by Goeyvaerts and Fano. *Structure 1a,* the "exposition piece" of the three comprising the 1st Book, was premiered shortly after by Messiaen and the composer.

Music

The second of Messiaen's *Quatre Etudes* appears to be among the most abstract and least "sacred" of Messiaen's works. Whereas the other studies are based on "magical" rhythmic formulae noted on the Tierra del Fuego (*Île de Feu I & II*) and subjective interpretation of plainchant neumes *(Neumes rhythmiques)*—the "sacred" notation par excellence—*Mode de valeurs et d'intensités* rests on purely numerical formulae.

Yet Messiaen, more than most composers of his generation, would have been aware of the medieval penchant for praising God through numbers, and though it is doubtful whether, in 1949, he had any inkling of the complex numerical relationships M. van Crevel has demonstrated in Obrecht's *Missa Maria Zart,* he could scarcely fail to have been familiar with the magic numbers of Machaut's *Notre Dame* Kyrie. Besides, it is difficult not to see the three voices and the consequent 3×12 pitches as trinity symbols (one might argue likewise, though less convincingly, on behalf of the 3×8 durations and the 3×4 modes of attack; and 7 (attacks) is not without symbolic connotations, as Machaut's Kyrie shows). Finally, one

[5a] In actual fact it was Stockhausen himself who made the analysis since Goeyvaerts' knowledge of German was limited. Outraged at being accused of 'looking for a chicken in an abstract painting,' Adorno gained his revenge by dubbing the two young composers "Leverkühn and his famulus" (a reference to Thomas Mann's *Dr. Faustus*).

[6] Originally called *Struction.*

is struck by the way the study is divided into three parts, each ended by a low C♯, the 'omega' of the three main parameters—

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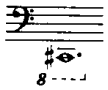
lowest pitch = 

loudest dynamic = fff

whose almost pitchless, bell-like timbre is the piece's nearest concession to pictorialism.

Though *Mode de valeurs* has necessarily been a subject for every 20th-century historian's attention, certain rudimentary facts about the piece are still sufficiently unclear in many an author's mind for it to be worth stating them here. Firstly, *Mode de valeurs* is in no sense a serial composition, even though it falls within the category of "durchgeordnete Musik." The pitch material of Messiaen's study is not a series, but a mode of 36 notes, divided into three 12-note groups. The modal character is stressed a) by the scalar arrangement of pitches over a span not based on the chromatic octave, and b) by the non-transposability of this pitch sequence. Each note of the chromatic scale occurs 3 times, but in each of the 3 divisions it occurs at a different (and constant) register, and receives different (constant) durations, dynamics, and mode of attack.

It would be quite wrong to suggest that the first book of Boulez's *Structures* is based on "the same series" as the Messiaen study. In fact, Boulez takes the first division of Messiaen's mode, and *converts* it into a series by bringing all the pitches within an octave. Once reduced to this format, the series is susceptible to transposition, inversion, and all the other technical prerequisites of serial composition. However, in effecting this conversion Boulez strips Messiaen's mode of many essential characteristics, and not least of its expressive content. That he should do so is utterly consistent with his avowed aims in composing the *Structures*; he was in search of a linguistic synthesis "which would not be marred by the start from foreign bodies—in particular, stylistic reminiscences . . . ."[7] More recently, Boulez declared quite explicitly that his intention was "to reach the limits of a musical language unknown to us. That was a very important research for me. The technique I found while working on this piece was reproduced in other works, which are oriented less to technique than to expression."[8] Crudely speaking, then, the aim of *Structures,* or at least of *Structure 1a,* is technical rather than expressive.

Now Messiaen's mode, and particularly the segment of it which Boulez chose for modification, is loaded with expressive potential. Any student of

[7] "Nécessité d'une orientation esthétique."

[8] U. Stürzbecher, *Werkstattgespräche mit Komponisten* (Gerig Verlag, 1971).

Messiaen's style in the 1940's will have found that one of its most consistent stylistic features is the "affective" cadential close with a falling tritone in the treble (see Fig. 1). Even in later works, where there is no

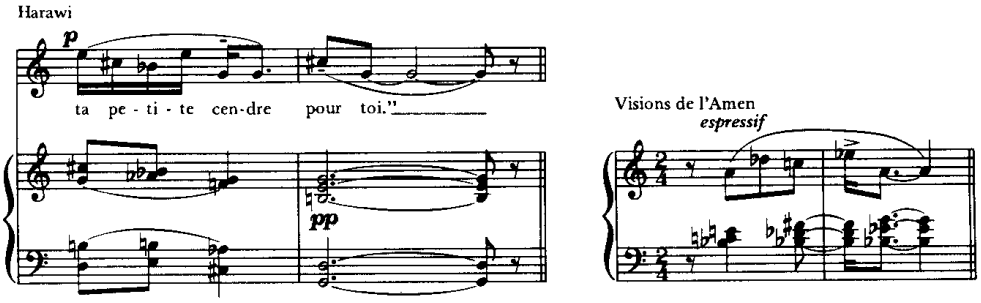


Fig. 1

question of tonal or modal cadence functions, this trait persists. Sure enough, Messiaen's "triplum" division ends with a falling tritone (see Fig. 2); but though this final interval is the only explicit tritone in the upper division of the mode, all twelve notes are linked in 6 falling tritone pairs (by which I mean direct tritones without octave displacements; obviously any set of 12 notes can be forced into some sort of tritone pairing).

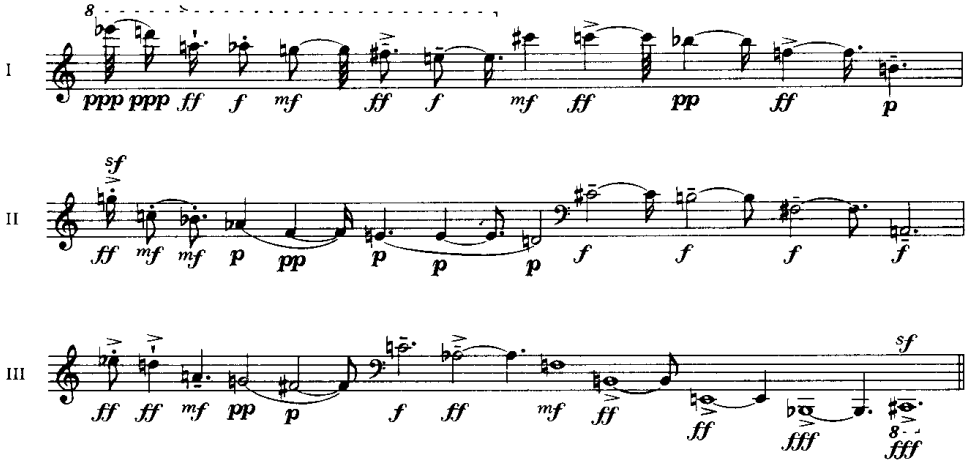
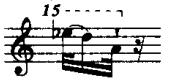
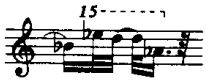


Fig. 2

This fact is significant simply because Messiaen makes great play with these tritone figures: halfway through the piece the figure



(1-2-3 of the mode) is on the verge of being supplanted by a more explicit form of Messiaen's favorite interval



(i.e., 1-2-4). The middle division is more neutral in its interval content, particularly at the beginning and end, the parts emphasized in the composition (perfect fifths, major seconds, thirds; no adjacent tritones, and only three possible tritone pairings). Indeed, the whole function of the second part is very much that of a "middle voice": it has neither the velocity and brilliance of the upper part, nor the warmth and resonance of the lowest part, and its durations lie within a relatively neutral field (𝅘𝅥𝅯 to 𝅗𝅥.). Essentially, this middle voice functions as a passive axis for the more assertive outer voices; accordingly, the initial pivot note G occurs more insistently than the E♭ pivot notes in the outer voices (despite the fact that its durations are twice as long as those of the upper voice). The lowest voice, as suggested above, uses a modal segment with considerable similarities to that of the upper voice: the most striking similarity concerns the pitch layout (1-2-3-4-5- of division III = 1-2-3-5-6- of division I). Yet there are interval analogies with the middle division of the mode: one finds the major third and perfect fifth both absent from division I, so perhaps the lower voice should be considered as a fusion of the two higher structures (the tritone content rather bears this out: 3 adjacent tritones—1 indirect). Lastly, the pitch profile of all 3 divisions is markedly similar. Each one starts with a leap (notes 2-3 in divisions I and III, 1-2 in II), followed by a concentration of small intervals in the middle, and a group of large intervals toward the end.

One more general characteristic of the modal interval structure is worth noting: after the initial leap and subsequent close pitch steps, there is a tendency for the intervals to augment as they approach the bass register. This holds good not merely within each division of the mode, but also for comparable stages in the different divisions of the mode (see particularly notes 9-12 of each division), and has sound acoustic reasons for being so, in that the clear perception of interval decreases in extreme registers, particular in the case of a resonant instrument like the piano.

It may seem paradoxical that so much time has been devoted to the pitch mode when it is the modal organization of all four parameters that makes this piece unique. But of the two primary parameters (pitch and duration) it is pitch organization that constitutes the major innovation in Messiaen's work: rhythmic cell organization is a constant characteristic of the works preceding the *Quatre Etudes* (cf. *Cantéodjaya*). As far as rhythm is concerned, Messiaen uses 12 durations for each division, arranged in increasing order as multiples of a basic value: 𝅘𝅥𝅯 for the first

division, 𝅘𝅥𝅯 for the second, and 𝅘𝅥𝅰 for the third. Clearly the gap of 1 "time-octave" between each basic value leads to a certain overlap between the modes; since durations 1,2,3 . . . of division III correspond to nos. 2,4,6 . . . of division II and 4,8,12 of I, the number of different durations used is not 36 but 24. Now Messiaen describes this progression 1t, 2t . . . 12t for each modal division as a sequence of "chromatic durations." Actually, as Stockhausen demonstrates in ". . . wie die Zeit vergeht . . . ," it is nothing of the sort. A truly chromatic scale of values would comprise 12 durations with a ratio of 1:2 between the fundamental and the 12th interval (i.e., the beginning of the next "octave"). When Boulez converts Messiaen's pitch mode into a series for his *Structures* and matches it by the same group of durations from 𝅘𝅥𝅯 to 𝅗𝅥., there is clearly a gross disparity between pitch organization and rhythmic organization, a point which every commentator has been quick to seize upon. But the proportions of Messiaen's duration mode (i.e., each division of it) correspond to those of a subharmonic pitch scale (see Fig. 3), whose first 12 values would cover a range of 3½ octaves.

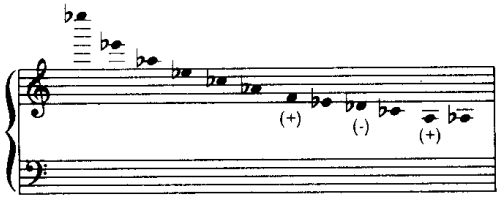


Fig. 3

As it happens, the 3 divisions of Messiaen's pitch mode cover 2⅓, 2⅚, and 4⅙ octaves, respectively (on average, just over three octaves—a fair approximation). So even though there is no precise equivalence, and the profile of pitch and duration modes are dissimilar, one can at least claim that the two are organized on analogous principles. Seen in this light, it looks as if Messiaen's instincts have served him better than his powers of verbal description.

I implied that timbre (attack) and dynamic were secondary parameters; Messiaen's treatment of them here bears out this designation. Their primary function is to emphasize the "point" character of each note, and to minimize association between the same notes in different octaves. Certainly Messiaen's schematic diagram of the mode looks as though dynamics were largely conditioned by duration, and attack by the combination of these two factors. For example, to compensate the relative lack of activity in the lower register, all but one of the notes below C = 256 Hz are *f* or louder. Similarly, these low notes all have attacks calculated to sustain tone through the required duration, >, ≥ or —. In short, the distribution of

dynamic and attack values is governed by purely practical considerations, and since there is no need for the various parameters to show serial interchangeability, the irrational dynamic/attack combinations familiar from Nono's early work don't arise. Messiaen doesn't feel obliged to distribute the 12 attacks and 7 dynamic levels evenly. For example, *ppp* occurs twice (first two notes of the mode), as does *fff* (last two), but *ff* occurs 10 times. Nor is variety within a section of the mode required (see notes 9–12 of division II, where dynamic and attack are absolutely uniform). Arrangement of all 36 notes of the mode in descending order shows general zones where certain kinds of attack and dynamic predominate, but no systematic organization (see Fig. 4 on next page).

So much for the basic materials of the piece. Since we are dealing with a modal composition, not a serial one, there is no question of material determining form, or of the "automatic" form to be found in *Structure 1a*. So what is the form? Antoine Goléa, and other writers after him, describe the piece as a 3-part canon. Frankly, it is difficult to see how Goléa arrives at this conclusion, other than on the basis of preconceptions as to what the form *ought* to be. Certainly the 3 divisions of the mode unfold in linear counterpoint, but canon and counterpoint are scarcely interchangeable concepts! Since the pitch order of all 3 divisions is different, successive presentation of all values from 1–12 would hardly qualify as a pitch canon; on the other hand, it *would* constitute precisely the kind of rhythmic canon to be found in many earlier works (e.g., *Visions de l'Amen, Vingt Regards*). Alternatively, the order of notes within the modal divisions could be permutated to provide a limited pitch correspondence. Either of these procedures could be termed canonic; but Messiaen doesn't use them!—whether in basic form, retrograde, augmentation or any of the other classical or renaissance usages (even though the pitch similarities between the first few notes of divisions I and III would make a simple canonic exposition quite possible). Besides, there are relatively few consecutive presentations of all 12 values in a division, and only one of them is in the basic order (division I: starting at bar 3 of page 11, and even this mutates 9, 10, (12), 11, 12); the rest are permutations of the type *1* 12 *2* 11 *3* 10 . . . or *1* 12 7 *2* 11 6 *3* . . . or simply *1 2 3 12 11 10* . . . . Finally, if canon were involved, it is unlikely that Messiaen, whose prefatory notes of this period are always very specific as to the technical means employed in a piece, should fail to mention the fact.

If no canon, what then? As we saw, a tripartite form; this tripartite division doesn't rest solely on the triple iteration of bottom C♯, since the first two both mark the cumulation of one of the few complete "series" (not necessarily in the bottom part). In the first section, the upper division, which begins with an irregular exposition of the mode's basic form (numerically, 1 2 3 4 6 5 7 10 11 12 (11) 8 9—see below), ends with a

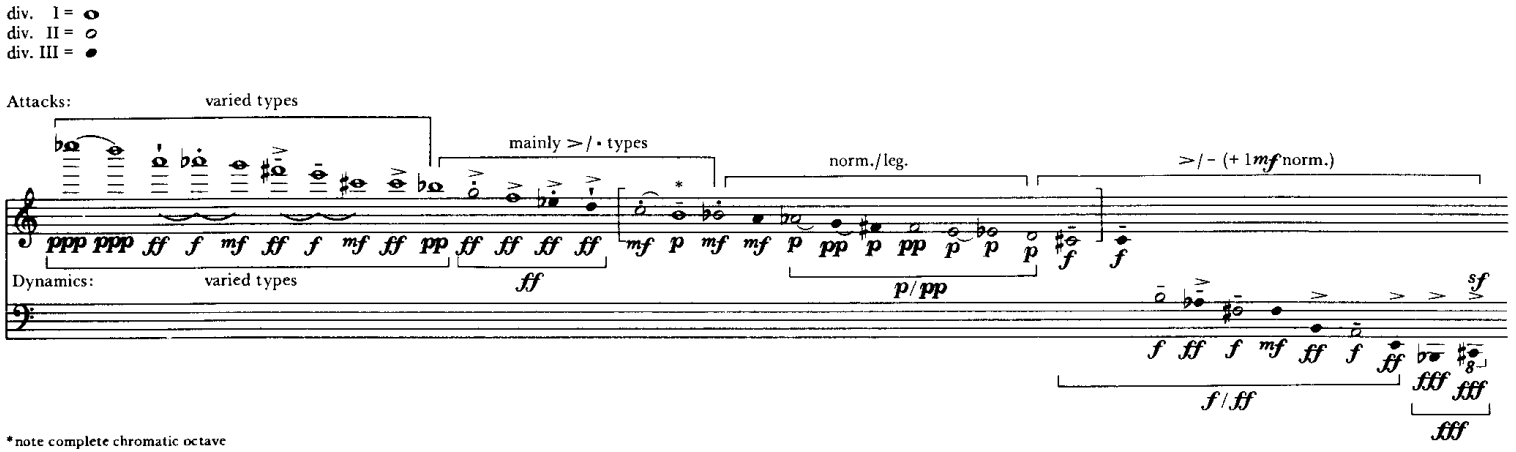


Fig. 4

permutation which sets the first half of the mode against the retrograde of the second half, thus: 1 12 2 11 3 10 4 9 5 8 6 7. Simultaneously, division II ends with a "defective" retrograde from which the 10 value is missing (8 12 11 9 7 6 5 4 3 2 1). In the long second section, the C♯ is reached at the end of the lower division's first attempt at systematic presentation, a permutated group 1 7 2 8 3 9 4 10 5 11 6 *12*. Paradoxically, despite this triple division, *Mode de valeurs'* most important formal characteristic is its apparent continuity, the way in which all the single points seem to describe the outlines of one enormous constellation (Stockhausen's first impression on hearing the piece was of a "fantastic star music").[9] It is this freedom from any kind of dualistic structure, whether orientated to the sonata (like Boulez's early work) or to the ABA "Lied" type (at most one could speak of A_1 A_2 A_3), that was to prove so important to the composers who followed in Messiaen's footsteps—one thinks of Stockhausen's "Nicht gleiche Gestalten in wechseldem Licht. Eher das: verschiedene Gestalten im gleichen Licht, das alles durchdringt."[10]

Earlier I described the upper voice as a "triplum," and not without good reason: two strong influences on *Mode de valeurs* are the Indian raga and the late Ars Antiqua motet. The significance of the raga is clear when we consider the mode itself. The raga is more than a scale: it is a selection of notes arranged in ascending/descending form which already carries with it certain melodic and rhythmic implications. Given that in Messiaen's mode the rhythmic implications are a set of fixed durations instead of a fundamental accentuation scheme, one can nevertheless see a certain amount the two species have in common. As for the Ars Antiqua motet, two characteristics are implanted straight into Messiaen's *Etude*. But first, one notes with surprise that a feature one might have expected, isorhythm, is in fact absent; the rhythm is not organized on a systematically repetitive basis (perhaps because, though the durations lend themselves to "talea" organization, the medieval "color" principle is excluded by the inflexible pitch-duration pairings). What *is* present is a typical feature of the late 13th-century motet, namely the simultaneous presentation of three "speeds" in the three voices, with the duplum written in longer values than the triplum, and the tenor in still longer values (there is a striking analogy with certain pieces by Petrus da Cruce). The other quasi-medieval feature is the separation of the triplum tessitura from those of duplum and tenor, which tend to overlap substantially (the Fig. 4 diagram of the total pitch mode shows this very clearly).

An examination of the precise contents of the first few bars may give an indication of the composition "process." Before embarking on this, a few

[9] K. H. Wörner, *Karlheinz Stockhausen* (Tonger Verlag, 1963).
[10] "Arbeitsbericht 1952/53" (*Texte I,* DuMont Schauberg, 1963).

more stylistic characteristics should be noted. Firstly, as far as possible Messiaen uses cohesive segments of each modal division, in either basic or permutated order—i.e., 1 2 3 4, but also 4 3 2 1 or 3 4 2 1, 2 4 3 1, etc.; complicated permutations are only effected on complete or near-complete divisions. Secondly, Messiaen avoids octave doublings, and aims to leave a reasonable elapse of time (usually at least ♩) between a note and its repetition in that or another mode (i.e., octave). Thirdly, the "head motive" of each division tends to occur more regularly than any other segment (pivot function).

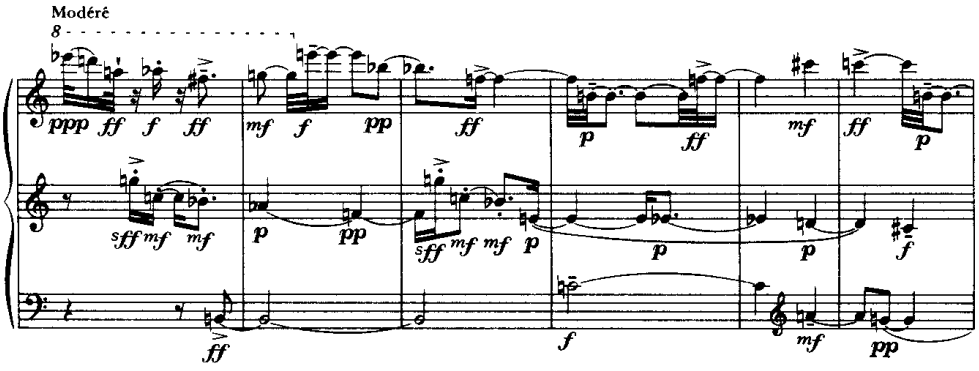


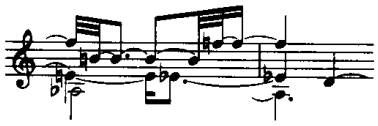
Fig. 5

The piece opens with an exposition of the openings of divisions I and II (1 2 3 4 6 5 7 and 1 2 3 4 5, respectively) with the entry of II delayed by an eighth note. This has the advantage of making attacks coincide:

I		4	6	5
II	2	3	4	

The interchange of 5 and 6 also leaves a reasonable gap between the two G's in I and II. Since the rhythmic coincidence $\binom{6}{3}$ leaves a slight hiatus, the third voice is brought in on the last eighth of the bar. Clearly a long value is desirable to stress the sustaining function of the lower part, and lend stability to the initial impulse of the upper parts. 12, as we have seen, is reserved for points of structural significance, 11 (B♭) would double 3 in the duplum, 10 (E) would cause the same problem in the upper part (octave with 7). So 9 offers the best solution (7 and 8 = 4 and 5 of II, and are thus clearly out of the question). Continuing with division I, 8 or 9 would be possible (though not both in succession if II is to resume with a return to 1 2 3, which would bring about an octave doubling on C), but neither sounds particularly well with 4 5 in II; 5 7 8 outlines a C-major triad, and 5 7 9 produces a Bartókian false relation with 4 5 in II, as well

as saturating the second bar with falling minor thirds. 10 offers a better harmonic and melodic result. The return to 1 2 3 in II betrays the weakness of any mode based on augmenting durations: it always tends to result in rhythmic stagnation, in a plethora of neutral values. Going back to the beginning of the mode revitalizes the rhythmic situation by providing attacks on 4 successive sixteenths (though it creates an unfortunate F-major polarity in I and II), and permits I to continue with 11 and 12. The head motive 1 2 3 in II is followed by a resumption of the mode from where it left off previously (5) i.e., 6 7 8 9. In III, Messiaen's aim is clearly to work backwards to the beginning of the mode. 8 (F) would double 11 in I, and create an impossible F-B polarity in the outer voices; the reiteration of 12 in I just after a B has been released is debatable enough, and calls for a bass progression that will effectively neutralize the B; 7(A♭) doesn't really accomplish this, contributing as it does to the diminished seventh chord feeling already established by B-F. Besides, it lends a rather unsavory harmonic langor to bar 4, aggravated by the imminent D in bar 5.



A rising 9th to 6 (C) has exactly the desired effect, and leads back to the beginning thus: 3 4 5 1 2 (followed by the omitted 7 and 8).

The reader can easily continue such an analysis for himself; these few bars are sufficient to demonstrate the stylistic principles indicated above, and emphasize that though a cohesive modal order can usually be maintained in one or two voices, much of the note order is arrived at on the dual basis of taste and expediency. The concentration of formal procedures at the end of each of the work's formal sections (though not exclusively there) suggests an analogy with the placing of stretti in the classical fugue structure. As a formal model, then, the piece has little to offer except its continuity: its main achievement is the combination of "point" characteristics with a remarkable rhythmic dynamism.

Like Boulez, the Belgian composer Karel Goeyvaerts (born 1923 in Antwerp) was already an established composer by the time Messiaen wrote *Mode de valeurs:* he was awarded the Lily Boulanger Prize that very year. After studies at the Antwerp Conservatoire he transferred to Paris, where he studied with Messiaen and Milhaud. Like all Messiaen's early pupils, he would have learned of the work of the Viennese school

through Leibowitz, and in fact it was Goeyvaerts who first drew Stockhausen's attention to Webern's later works.[11]

Analysis of Webern's works in 1949–50 left Goeyvaerts surprised that such subtle handling of the pitches was accompanied by an almost primitive approach to durations and dynamics. But most important of all, he decided that the only justification for a "rational" ordering of notes would be as the "projection of a metaphysical datum."[12] To this end, an organic structure was needed, and in the 2-Piano Sonata this took the form of "continuity between rational determination and irrational intuition." Thus the very cleanly articulated inner movements represent a "rational" kernel, most fully realized at the junction of the 2nd and 3rd movements, which regresses back (in the 4th movement) to the "irrationality" of the opening. The two examples in Fig. 6 illustrate this antithesis clearly: the first, from the beginning of the first movement, contains the most "point"-orientated music in the work, while the dense linear polyphony of the second examples typifies the "irrational" linear counterpoint of the outer movements.

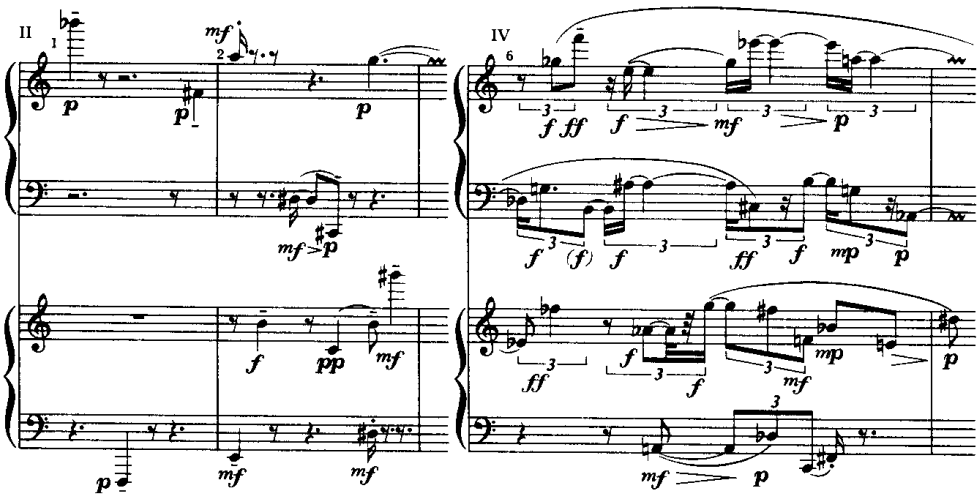


Fig. 6

Retrospectively, the 2-Piano Sonata emerges as less than a masterpiece, so what is there in Goeyvaerts' piece that the young Stockhausen would have seen as revelatory of a road to the future? Well, at any rate the 2-Piano Sonata offers a purposeful structure, and a certain kind of serial organization is substituted for Messiaen's modal procedures.

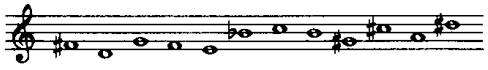
[11] Though only by word of mouth.

[12] For the influence of this standpoint on Stockhausen, see particularly the "Schlagquartett" essay (*Texte II*, pp. 13ff.).

The total form of the piece, which extends across all four movements, is a "cross-form," an X, in which material is retrograded from a central point at the end of movement II, and register and/or instrumentation are exchanged (in this case, merely the transition from piano I to piano II, rather like the Ars Antiqua *Stimmtausch* between equal voices); the influence of this form on *Kreuzspiel* is self-evident. The models for these techniques probably lie in Messiaen (register exchange in "Regard de l'Onction Terrible") and Webern (palindromes and a sort of register exchange, albeit on a small scale, e.g., first movement of Piano Variations).[13]

The strictness of this form, however, is mollified by certain not altogether fortunate qualifications, which undermine the work's claim to a single formal process (the same objections could be made to the form of *Kreuzspiel,* though this latter functions much more cohesively than Goeyvaerts'; the first real "one-form" piece is Stockhausen's *Kontra-Punkte,*[14] whose form is all the stronger for proceeding in a straight line from beginning to end—from points to group formations—rather than depending on mirror forms for unity). For a start, the movements are paired off I-IV, II-III, and slightly different principles operate within the two pairs; for example, exchange of register and instrument in I-IV, exchange of instrument and inverted direction of register transposition in II-III. Secondly, I-IV are characterized by dense linear polyphony and relative uniformity of durations, whereas II-III show lower density and greater "point" differentiation, enforced by intervals of entry ranging from ♪ to 𝅗𝅥. ♩.. Thirdly, a wide dynamic range in I-IV (*pp-ff*) is offset in II-III by the use of three adjacent values (*pp, p, mf*—and a very few *f*).

Then there is the whole question of pivot notes. In Messiaen's study we saw that a certain polarity was created by the use of "head-motives" from each division of the mode. In Goeyvaerts' Sonata the "anarchy" of athematic construction is offset by pivot notes at the distance of a tritone. At this point, let's quote the series which initiates the Sonata:



We noted that the 1st division of Messiaen's mode ended with a tritone. Goeyvaerts' series breaks down into two 6-note segments, each ending with a tritone. The latter of these (A-D♯) functions as the pivot axis for II-III. Logically, we might expect I-IV to employ E-B♭ in a similar way. But in actual fact the tritone pivot is drawn from the first notes of each half of the series (F♯-C), which means that the extrapolation of pivot notes in

[13] Goeyvaerts had made a detailed study of Webern's Piano Variations in the winter of 1949–50.

[14] And up to a point, Goeyvaerts' "Op. 3 with struck and bowed sounds."

I-IV has to be exterior to the underlying pitch orders. The result is that in I a fairly crude ostinato technique emerges, reinforced at the center point by additional ostinato blocks[15] (see Fig. 7). Goeyvaerts seems to recognize

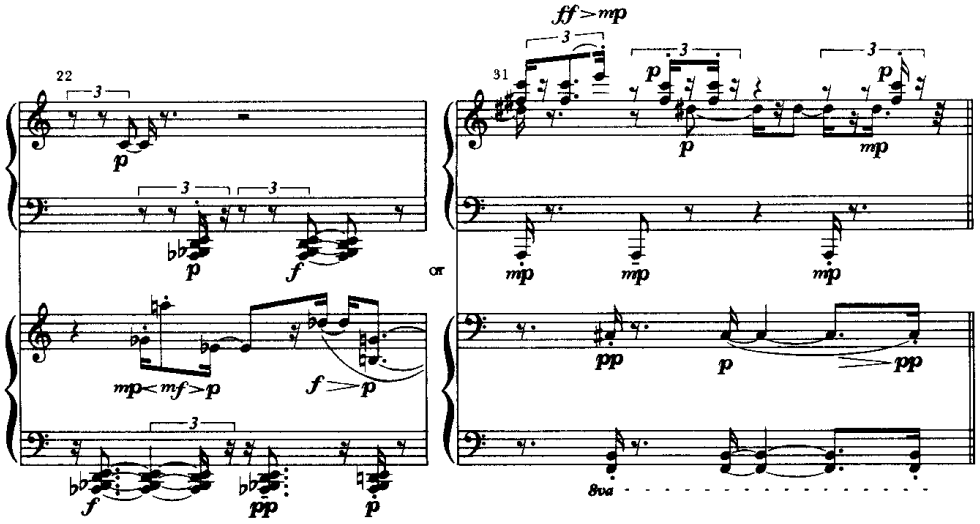


Fig. 7

the failings of these ostinato-blocks, since various subtractions in the retrograde note-sequence of IV include the complete excision of these ostinato cumulations, a musical improvement, but a formal inconsistency. Another element purged in the retrograde is the unpromising presentation of the series which opens the work, as well as the subsequent four bars in piano 1 (Fig. 8).

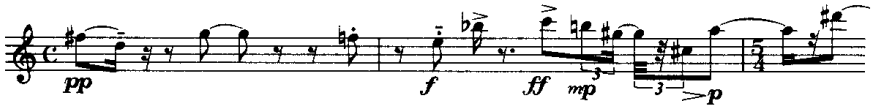


Fig. 8

This is actually a rather strange sort of series for a young composer familiar with late Webern to have used. Even given the work's "irrational–rational" program, didn't he see that the organizational strength of those late works rested partly on the choice of homogeneous series (see for example those of the String Quartet or the Concerto, Fig. 9).[16] A more

[15] Perhaps these ostinati wouldn't have seemed so offensive to Stockhausen, who was, after all, working on a Bartók thesis at the time.

[16] To be fair, the series of Op. 27, the work Goeyvaerts had studied most closely, is relatively non-homogeneous.

cohesive series would have removed the need for such subterfuges as pivots/ostinati.

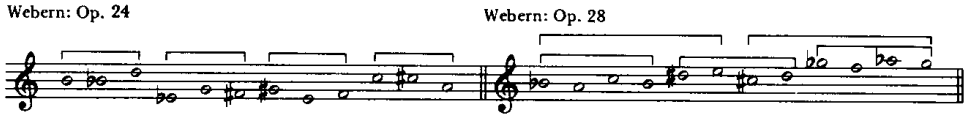


Fig. 9

Rather than attempt to deal with the whole sonata, we shall concentrate on the central pair of movements, since the first of these was the one chosen for exposition at Darmstadt in 1951.

As we said above, the movements form a mirror pair. In II, the pitches initially occupy a space of nearly 5½ octaves, and gradually concentrate within a space of 2½ octaves, this being the interval described by the pivot notes, which remain static. As other pitches recur, they are transposed up an octave (in this respect the pianos are independent of one another; it is only the recurrence of a pitch on the same piano that causes an upward transposition). When such transpositions lead them over the ever-decreasing pitch ceiling, the notes are reintroduced at the lowest available octave register. In III, the process is reversed; starting from the narrow range circumscribed by the pivot notes, repeated pitches are transposed *downward,* and then reintroduced at the top of the available range. Diagrammatically, the pitch rotation could be represented as follows:

Unlike the outer pair, there is no subtraction of pitches in movements II-III (with a couple of trifling exceptions). So the movements present the same number and sequence of notes, one the retrograde of the other, but with the notes of piano 1 appearing on piano 2 and vice versa. Each note of II has a duration and dynamic which is reproduced in III. But the four contrapuntal lines run out of phase in III, so a different superposition of lines results (another demonstration of the "abstract" nature of the material). The effect of this is most clearly seen at the end of II and beginning of III, where the parts are exchanged (see Fig. 10).

We have already seen in the I-IV pair how the insistence on pivot tritones led to a general weakening of the serial pitch construction. The same holds good for II-III. The mere fact that these pivot notes remain fixed in their register, as opposed to the octave transpositions of all the other notes, should have been sufficient to emphasize their function; however,

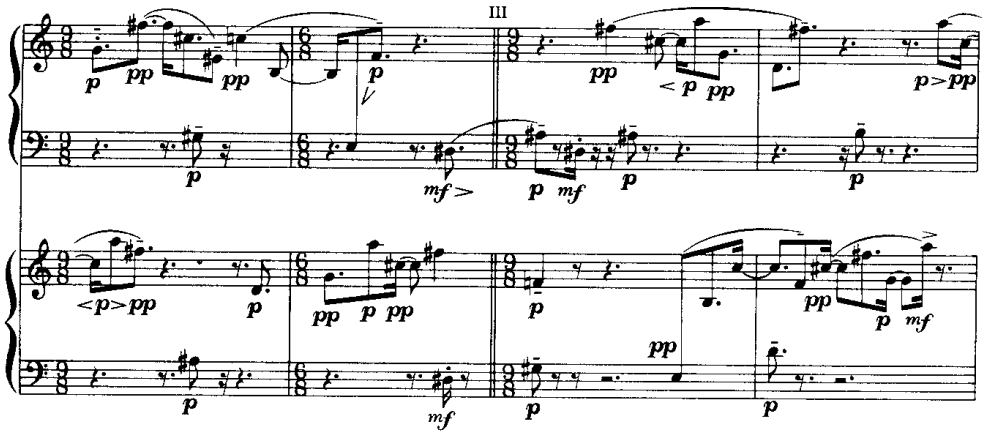
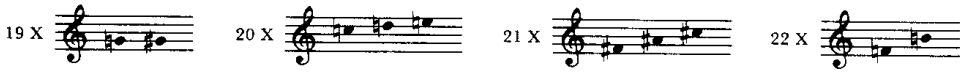


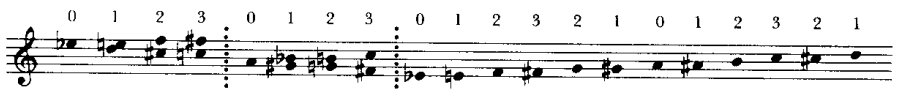
Fig. 10

Goeyvaerts stresses this function by adding further pivot notes characterized by the value , the result being that the pivot notes occur approximately 50 per cent more frequently than the other notes. I say "approximately" a) because the pivot notes A and E♭ do not occur equally frequently (slightly more E♭'s), and b) because the remaining notes are not evenly distributed. The actual distribution in II is as follows (III contains minor variants):

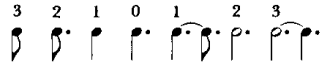


A and D♯ occur 30 and 34 times, respectively. However, if one removes their appearances in 𝅘𝅥𝅯 format, they occur 18 times each, and thus fall into place with the above arrangement. It will be seen in the above example that as the number of notes increases, so does the interval between the constituents of a group (19 = minor seconds, 20 = major seconds, 21 = thirds, 22 = tritones).

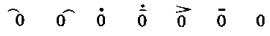
The relatively limited number of dynamic and duration values stems from a less obvious structural use of the pivot notes. (I am indebted to Dr. H. Sabbe for drawing my attention to the following procedures.) The two pivot notes are given a numerical value of 0; 1 denotes a semitone above or below a pivot note, 2 a whole tone, etc., yielding the following numbering of the chromatic scale:



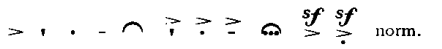
The durations are accordingly based on an "axial" value of 0 with three further degrees "upwards" and "downwards":



and the dynamics on four degrees of loudness (= 0–3), i.e., *pp, p, mf,* and *f*. It's a method that clearly has its drawbacks: given the above selection of durations, one can see that even apparent sixteenth values (at ♩ = 84!) are only possible through superimposition of parts. There is no subsidiary series to determine how much of each duration is filled by sound and how much by silence, but there is a general tendency throughout II (and hence reversed in III) for the sound to occupy a greater proportion of the duration as the movement proceeds (cf. the sustained notes in Op. 3). The seven attack categories are mainly selected with a view to assuring relatively smooth attack and release of the notes:



Cf. Messiaen's mode:



Now there is no a priori reason to object to this reduced number of attacks, particularly since this constitutes the most debatable aspect of Messiaen's study. What does seem regrettable is that the attacks are again chosen to neutralize the individuality of each sound.[17] We have seen that the actual durations are mainly short; maximum differentiation would have been provided by an attack series such as:

Once again, it looks as if Goeyvaerts is out to conceal his systematization: he does this by choosing all those attacks which are most familiar from "classical" usage, while the use of legato, which grows more pervasive toward the end of II (perhaps a borrowing from the second movement of Webern's String Quartet), grafts a slightly spurious type of "phrasing" onto the individual "points."

In short, for all its undeniable merits, inevitably minimized in a technical account of this type, it's difficult to believe that the actual music of Goeyvaerts' Sonata was as dazzling an inspiration to Stockhausen as the Messiaen study which he encountered at the same moment in time. But Goeyvaerts offered a working technique: the use of a single formal process for the whole work, and systematic arrangement of all parameters without the one-to-one mapping of Messiaen's study; what Stockhausen made of this basic material, we shall see now.

[17] Though once again, this follows from the required 'rationality' of the inner movements, as well as being the logical outcome of Goeyvaerts' extremely elegant brand of post-Webernism.

What better way to start than to quote Stockhausen's own note on *Kreuzspiel*.[18]

> The idea of a crossing of temporal and spatial procedures is presented in 3 phases: in the first phase (2′40″) the piano begins in the extreme outer registers and progressively brings into play—through crossing—6 notes "from above" and 6 notes "from below"; the middle four octaves (the joint range of oboe and bass clarinet) are employed more and more fully, and at the moment where an even distribution of pitches throughout the entire range has been achieved, the series governing durations and dynamics have been crossed in such a way that the initially aperiodic series are converted into a regularly shortened series in the case of durations, and a regularly louder series in the case of dynamics (i.e., accelerando and crescendo); this series is marked by the woodblock. The whole process then runs backwards in mirror form so that by the end of the phase we are again left with notes in the extreme registers of the piano; as a result of the crossing process, however, the 6 "top" notes are now at the bottom, and vice versa. When pitches and noises occur together, and this happens fairly often, there is a tendency away from systematised formal procedures: a note occurs in the wrong register, its duration or dynamic deviate from the series etc.
>
> In the second phase (3′15″) this same formal process is carried out from the centre outwards.... The third phase (4′) combines the two processes.

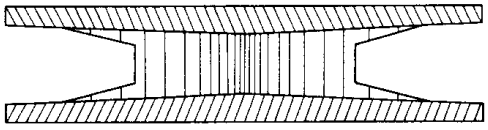
Immediately, one is struck by the number of similarities to Goeyvaerts' Sonata. Yet, and this is of crucial importance, scarcely a single feature of Goeyvaerts' work is accepted without modification and improvement. Take the most obvious similarity: the "cross-form." In Goeyvaerts' Sonata there are two separate crossing processes, each of which requires two movements for its completion, and each pair lasting about 5½–6 minutes. Now the inner pair doesn't represent a proper crossing, since what was in the high register at the beginning of II is still in the high register at the end of III, but on the other piano. In the outer pair true register exchange does take place, but since the total pitch range[19] is always available, the state of interchange is completely effected as soon as the fourth movement begins.

In Stockhausen's *Kreuzspiel*, the dynamic register process of Goeyvaerts'

[18] *Texte II*. For the sake of convenience, this analysis of *Kreuzspiel* is based on the published 1959 revision. The original version differs chiefly in the following respects: a) it uses an attack series; b) mm. 1–13 are substantially different; c) the trills and *sfz* series deviations of the published version are absent.

[19] Not a very large range: all but a few passages could be executed on an 18th-century fortepiano.

inner movements is combined with a genuine register exchange as in the outer pair. As far as the pitch distribution is concerned, the first phase is a sort of negative image of the Goeyvaerts:



We remarked earlier that for Stockhausen, acquaintance with the 2-Piano Sonata coincided with his first encounter with late Webern and Messiaen's study. Compared to Goeyvaerts, Webern's conciseness must have been all too evident; it's not surprising that Stockhausen compresses the whole formal essence of Goeyvaerts' Sonata into the first 2'52" of *Kreuzspiel.*

While the form of *Kreuzspiel* is indebted to the Belgian composer, the *écriture* retains a preference for Messiaen's *Mode de valeurs.* One sees this immediately by comparing, say, mm. 14ff. of *Kreuzspiel* with the opening of *Mode de valeurs* or the 2-Piano Sonata (incidentally, note the elliptical and unconscious tribute to Messiaen contained in the opening E♭-D) (see Fig. 11).

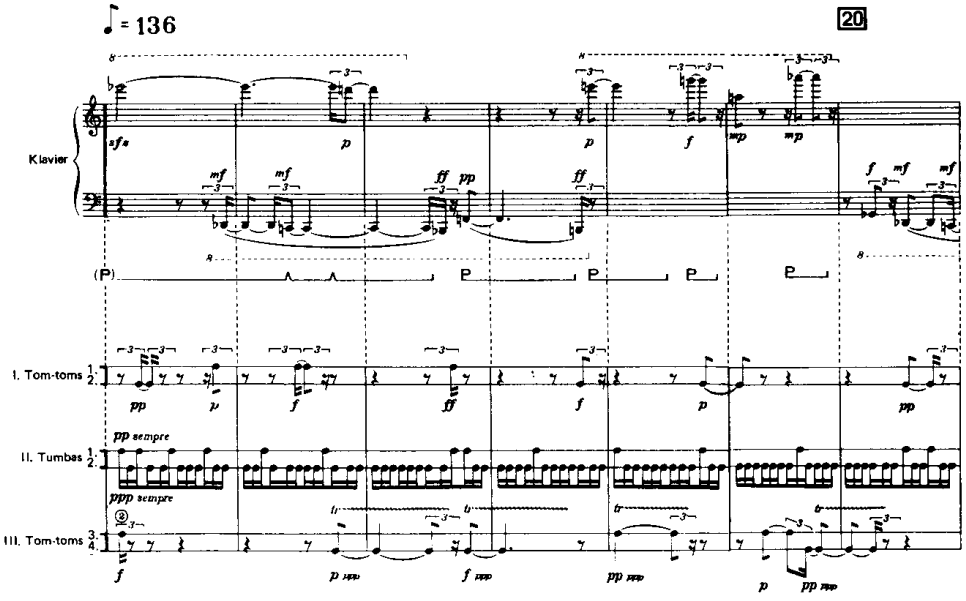


Fig. 11

The relationship goes beyond the similarity of piano style: a sort of modality ensures that despite the octave transpositions necessitated by the formal process, each of the 12 notes is always associated with the same

duration and dynamic (subject to modification when the attack coincides with a percussion attack). Taking only the first phase, which corresponds most closely to Goeyvaerts' model, we can best demonstrate this modality by means of a table (see below). The 12 columns refer to the 12 series which piano, oboe, and bass clarinet employ in the first phase, the figures designating the octave register (1 = lowest, 7 = highest). Naturally, no account is taken of the changing order of notes in each series:[20] what I want to demonstrate here is the way in which the various individual pitches are modified as they recur (the reader will find it desirable to follow the table with a score: each series corresponds to 1 + 2 + 3 . . . + 12 ×  = 6½ bars). Dynamics are also included in the table, and you will be able to see the effect of pitch-noise mutations, as well as a curious exchange of dynamic characteristics between F and E♭ (normally as will be found below, this exchange applies only to register).

Measures 14–91

F	1pp	6p	3p	4pp	5p	2pp	7sfz	7sfz	7sfz	7sfz	7sfz	7sfz
E	7p	7p	7mf	7p	7p	7p	2p	5p	4p	3p	6p	1p
E♭	7sfz	7sfz	7sfz	7sfz	2pp	5pp	4pp	3pp	6pp	1pp	1pp	1pp
D	7p	7p	2p	5p	4p	3p	6p	6p	1p	1p	1p	1p
D♭	1mf	1mf	6mf	3mf	4mf	5mf	2mf	7mf	7mf	7mf	7mf	7mf
C	1mf	1mf	1mf	1mp	6mf	3mf	4mf	5mf	2mf	7mf	7mf	7mf
B	1ff	1ff	1ff	1ff	1ff	6ff	3ff	4ff	5ff	1ff	7ff	7ff
B♭	1ff	1ff	1ff	6ff	3ff	4ff	5ff	2ff	7ff	7ff	7ff	7ff
A	7mp	2mp	5mp	4mp	2mp	6mp	1mp	1mp	1mp	1mp	1mp	1mp
A♭	7mp	7mp	7mp	7mp	7mp	2mp	5mp	4mp	3mp	6mp	1mp	1mp
G	7f	7f	7f	2f	5f	4f	3f	6f	1f	1f	1f	1f
G♭	1f	1f	1f	1f	1f	1f	6f	3f	4f	5f	3f	7f

(note the basic progression *7 2 5 4 3 6 1*)

The dividing line in the table marks the end of the woodblock series referred to in Stockhausen's note. So it will be seen that not only do notes exchange register, but they do so by exchanging precise characteristics with those of a note from the opposing pitch segment, whose register and dynamic they then reproduce in retrograde. Thus E♭ exchanges with B♭, D with B, E with F, G with C, A with G♭, and A♭ with D♭. Reading the columns vertically, one sees how the various octaves are gradually filled toward the center (1 and 7 in series I, 1, 2, 6, 7, in series II, etc.). The rhythmic structures (interval of entry series) are threefold (as in *Mode de valeurs*) and rest on systematic permutations which give rise to the kind

[20] Which follow a periodic → aperiodic permutation sequence.

of magic square familiar from *Structures* (though of course *Kreuzspiel* is the earlier work)—naturally the pitch flow results from the interval of entry series. In phase I, the three "contrapuntal" rhythmic lines unfold in I. piano/oboe/bass clarinet; II. tumbas; III. tom-toms. As an example, I give the rhythmic square for the tumbas (starting halfway through m. 7): the first series was a "canonic" anticipation of the first tom-tom series:

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

Rather than go further in describing a work which is, after all, relatively well known, I should like to make a few general observations. We have already noted the instrumentation. Now the most superficial difference between *Kreuzspiel* and the other four works dealt with here is that it uses instruments other than the piano. Messiaen's study is for solo piano, the Sonatas by Fano and Goeyvaerts, and Boulez's *Structures,* are for 2 pianos. In the latter three cases, at any rate, the choice of instruments proceeds from a desire to exclude instrumentation, to find an "abstract" medium to match "abstract" musical thought; what Boulez writes of *Structures* is applicable to the whole group: "The piano was chosen as the instrumental sound source, not so much on account of its direct qualities as for its lack of failings."[21] Remember that *Structures* was composed after *Polyphonie X,* and the resort to an abstract medium is a retreat from a seemingly insoluble problem, as Stockhausen emphasizes in the "Arbeitsbericht 1953."[22] The choice of instruments evolved only slowly into the present one; the piece started out as a "Mosaik" for high voice and piano in which, naturally, the register process could only be carried out from the top to the middle. Later a bass voice was brought in to allow register contractions and expansions in both directions, and at around the same time, Stockhausen decided to incorporate a purely rhythmic layer necessitating the

[21] "Nécessité d'une orientation esthétique."

[22] *Texte I;* in this context, one thinks of Stockhausen's comment on Boulez: "Sein Ziel ist das Werk, mein Ziel eher das Wirken."

use of various percussion instruments. The final transformation occurred when the voices were dropped and two wind instruments substituted (which explains why the oboe and bass clarinet parts coincide more or less with the range of soprano and bass-baritone, respectively).

More significant than this, however, is the role of the percussion. Whereas the dodecaphonic composers had been almost embarrassed by the presence of unpitched percussion (Webern avoids it completely in the two purely orchestral works—the Variations and the Symphony) and usually used them to reinforce (rather, to betray) stylized conventional gestures, in *Kreuzspiel* the percussion are as well able to carry serial organization as the pitched instruments.[23] This leads to a confrontation, on equal organizational terms, between *pitch* and *noise*. In *Kreuzspiel* these two forces are opposites (and their coincidence causes serial deviations): their mediation was to be Stockhausen's primary task in the mid-1950's. So when we observe the results of this mediation in *Gesang der Jünglinge,* for example, we would do well to remember that the seeds lie in Stockhausen's earliest acknowledged composition: it must have been the paradox that such apparently disparate elements could be analogously organized that led him, via the sound experiments in Paris, to realize that they lay within a single continuum.

All this is hindsight, though. In *Kreuzspiel* the various instruments have a clearly defined formal purpose. The division of the pitch range into inner and outer octaves is clarified by the antithesis piano/oboe-bass clarinet. The entry or disappearance of the wind instruments indicates that a certain stage has been reached in the saturation or evacuation of a certain register. Of course the piano is capable of using the whole register itself, so its limitation to the outer registers is a purely didactic device; in the third phase it juxtaposes a "middle register" against the "extremes."

I said that the percussion had equal status with the pitched instruments; in fact, it goes one better than this (again, perhaps, didactically): in the first phase, two of the three serial strands are allotted to the percussion. Even at this early stage, however, Stockhausen was evidently aware that polyphonic superimposition of durations on similar instruments had the effect of mutual cancellation. So the two strands are clearly differentiated, and not only by timbre—one thread comprises accentuations of a continuous pulsation, based on the shortest value  (tumbas—even dynamics

[23] One shouldn't forget that Nono's *Polifonica-Monodia-Ritmica* was also played at Darmstadt in 1951; the last movement, despite its musical deficiencies, gives a starting point for the serial organization of percussion. In other respects, for all that Metzger called it "the first interesting composition of the post-war years," the piece is unremarkable. The *Polifonica* movement leans heavily on Webernesque double canon coupled, as in *Monodia,* with a lyricism which is not as remote from Nono's disavowed teacher Malipiero as he might have thought.

apart from an *f* ⟶ *ppp* to mark the halfway point), the other consists of single "point" attacks/rolls (tom-toms, with varied—modal—dynamics).

In short, *Kreuzspiel* not only offers substantial improvements of its models, but some clear pointers to the future as well. The three instrumental families in *Kreuzspiel* become six in *Kontra-Punkte*. The sound/noise opposition is resolved by the early electronic works.

But we are digressing. To find the origins of Fano's Sonata we need to return to Messiaen's study. Fano was a Messiaen pupil at the same time as Goeyvaerts, and may thus have known Goeyvaerts' Sonata, but if so he thought a good deal less of it than did Stockhausen, for his Sonata points in a quite different direction—to the path which led, via *Structures,* to French "neo-serialism."

Compared to the tentative researches of Goeyvaerts' Sonata, Fano's seems extraordinarily sophisticated, both as regards its form and technique. Many of the characteristics of *Structure 1a* are readily found in this earlier work, together with others which anticipate the more elaborate techniques of *1b* and *1c*. Certainly Fano's work is free of the automatism of *Structure 1a;* once one technique has been proven, another is attempted. Instead of Messiaen's quasi-ternary form or Goeyvaerts' extended palindromes, we find an exposition which in itself goes well beyond both these works in achieving a convincing form of integral serialism, followed by a number of brief developments, each examining the material from a different angle (so we can see that the analogy Boulez has made between *Structures* and the *Art of the Fugue* applies in equal measure to Fano's composition).

Let's look at Fano's basic material. The pitch structure is fully serial, and rests on the symmetrical series shown in Fig. 12 (once again, note the prominent function of the tritone).

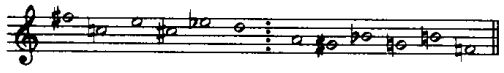


Fig. 12

This kind of converging series is familiar from Nono's work (though relative to the most symmetrical possible series of this type, notes 1 and 12 have been exchanged so as to give the tritones at the end). One obvious characteristic of this series is that it has no inversion, since the mirror form of the series simply corresponds to the retrograde form transposed up a semitone.

The exposition occupies the first five lines (two pages) of the score. Each line corresponds to one statement of the series or a polyphony of series. At once we see an advance on the work's predecessors. Whereas

Goeyvaerts and Messiaen adhere to a specific number of polyphonic lines throughout a whole movement, Fano varies the number of polyphonic strands in each line[24] so that the five lines present all 12 transpositions of the series with 2, 3, 1, 4, and 5 simultaneous strands, respectively.

Before looking at the practical results of these superimpositions, a word about the treatment of the other parameters. Fano rejects the idea of "attack" being a self-sufficient category. But dynamics and durations are organized, and are not modally attached to particular notes as in Goeyvaerts and Messiaen (not necessarily, that is; we shall see that *some* series *are* deliberately set in a modal relationship). As with Messiaen, a series of 12 "chromatic" durations based on 𝅘𝅥𝅯 is used, related to the chromatic scale, so that the difference in duration between two notes corresponds to their distance apart measured in semitones (considered with reference to the closest possible position). This gives the pitch series cited above a duration series of 1 7 11 8 10 9 4 3 5 2 6 12.[25] From this one can see another advantage of the exchange of 1 and 12 mentioned earlier—it prevents all the long durations from occurring in the same half. The total list (only valid for the exposition) is given below; the dynamics table is combined with it.

F♯	1ff	7pp	11f	8mp	10mf	9p	4p	3mf	5mp	2f	6pp	12ff
E	2mf	8p	12mp	9mp	11pp	10pp	5ff	4ff	6f	3f	7mf	1p
E♭	3f	9mp	1p	10mp	12mp	11pp	6f	5ff	7ff	4mf	8p	2mf
C♯	4p	10mf	2pp	11p	1pp	12mp	7ff	6f	8ff	5mf	9f	3mp
D	5mp	11f	3pp	12mf	2mp	1p	8f	7mf	9ff	6p	10ff	4pp
B	6pp	12ff	4p	1ff	3mf	2f	9p	8mp	10mf	7pp	11mp	5f
C	7pp	1ff	5mp	2f	4p	3mf	10mf	9p	11f	8mp	12ff	6pp
B♭	8p	2mf	6f	3f	5ff	4ff	11pp	10pp	12mp	9mp	1p	7mf
A♭	9mf	3p	7ff	4mf	6ff	5f	12pp	11mp	1pp	10p	2mp	8f
G	10mp	4f	8mf	5ff	7f	6ff	1mp	12pp	2p	11pp	3mf	9p
A	11f	5mp	9ff	6p	8f	7mf	2mp	1p	3pp	12mf	4pp	10ff
F	12ff	6pp	10mf	7pp	9p	8mp	3mf	2f	4p	1ff	5mp	11f

The purpose of the irregular sequence of transpositions is to ensure that a pitch does not become modally associated with the same duration all the time.

Fano uses six dynamic levels: *pp, p, mp, mf, f, ff*. Each dynamic series uses each of these values twice. One of the disadvantages of the dual purpose table above is that it fails to show clearly that what Stockhausen does with register organization in *Kreuzspiel,* Fano does here with dynamics. The 12-duration series actually comprise six symmetrical pairs. These pairings are sometimes retrogrades of one another, sometimes simple permutations. The pairings are: C/F♯; C♯/G; B♭/E; E♭/A♭; D/B; and A/F.

Now let's see how this works out in practice. I have deliberately chosen

[24] A technique resumed by Boulez in *Structures.*

[25] 12 is regarded as leading on naturally to 1, rather like a clock face.

the opening of the work because though the strands usually run completely independently, there are often interactions between coinciding regions which result in durations which are a fusion (not always addition) of the two values involved. Such is the case here. The two series involved start on C and F♯ respectively, and are closely related in all parameters (see Fig. 13). In their "pure" form, the two series are shown in Figs. 14 and 15.

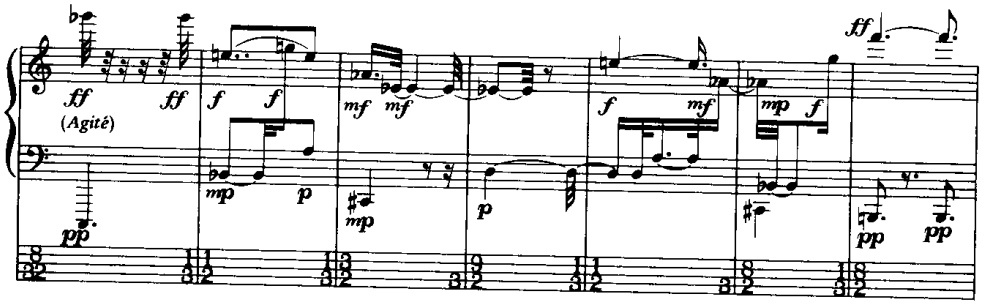


Fig. 13

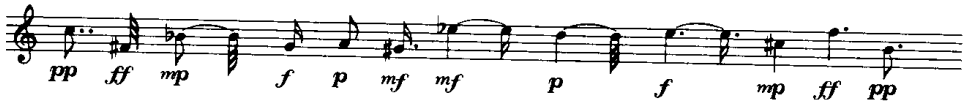


Fig. 14

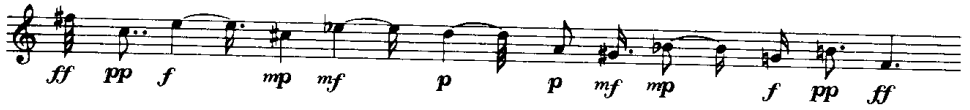


Fig. 15

The similarity of these series is immediately evident to the eye; they are the two most symmetrical of all 12, and in this case the duration and dynamics of individual notes *are* identical in both series. The above example can now be resolved: the C is a fusion of two values—that in the *C* series is viewed as lasting till the sixteenth note before the G♭ at the end of the measure; that in the G♭ series ends at the barline. The E♭, D, and F, all of which have effective durations of more than ♩., can be similarly accounted for. Naturally, these fusions are only possible because the dynamics of the two series correspond.

The final pair of series in the exposition, starting on F and B, also relate modally to the durations/dynamics of the first two; they are presented in retrograde order to provide the same B/B ending as in Fig. 13, and hence a clear section ending.

It would require a whole article to demonstrate all the developments

which follow: a few must stand for the whole. The exposition was based on polyphonic juxtaposition of series, so the first development concentrates on the exposition of 12-note fields in quasi-contrapuntal form, dispensing with variation of dynamics ("fixed parameter") and employing a system of rhythmic cells rather in the manner of early Boulez. Webern's method of using the last notes of a series as the first notes of the next (e.g., Concerto, Op. 24) yields a continuous sequence of transpositions by a fourth. The series used in this example (Fig. 16) are the C transposition shown above, followed by the F transposition.

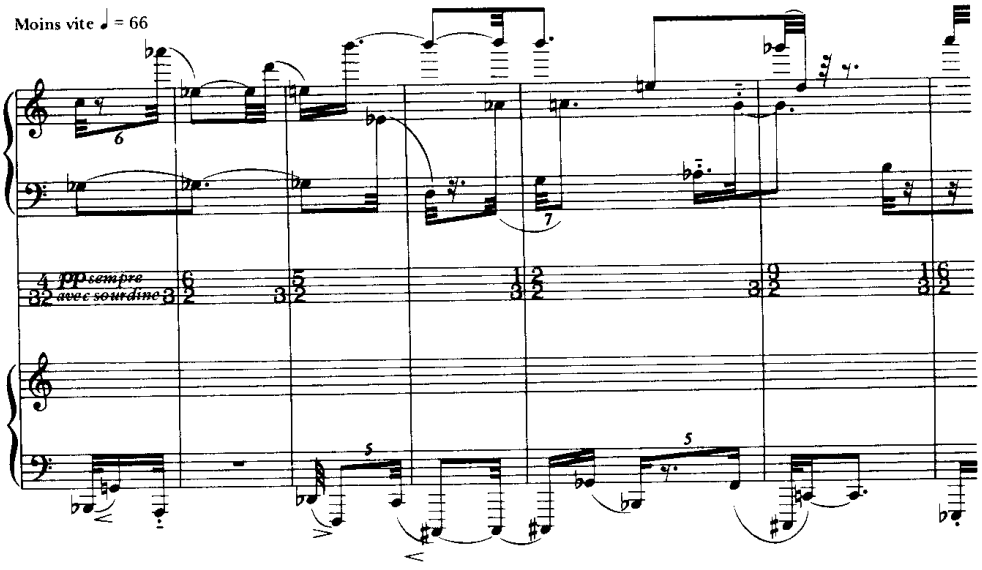
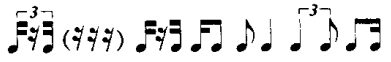


Fig. 16

Many developments rest on the juxtaposition and superposition of similar series. The following example takes this to an extreme point by using a fourfold superposition of the C series. The two pairs run in canon at a distance of 3 sixteenths, and each pair consists of a basic and retrograde form which cross over at the center point (presumably modeled on the first movement of Webern's Piano Variations). (See Fig. 17.)

Clearly the superposition of so many identical series necessitates that the octave register of each note be completely fixed. The rhythm makes sophisticated use of the simplest possible material, the cell ♪♪, subject to various augmentations and retrogradings (as expounded by Boulez in the article "Propositions" of 1948, and clearly the result of Messiaen's teaching). In the lower line of piano 1, for example, the sequence is the following:



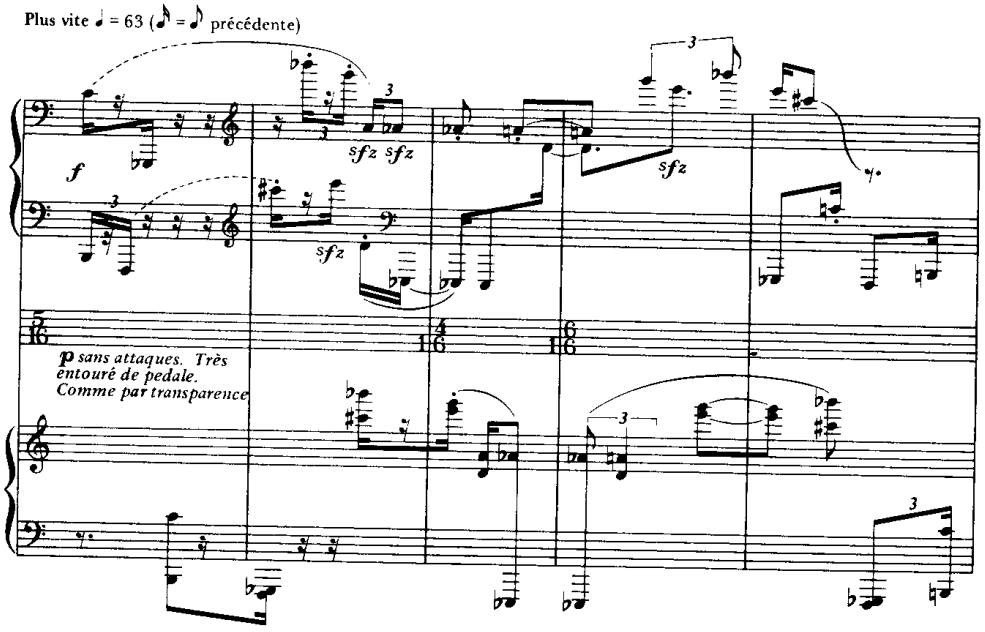


Fig. 17

From these techniques, and particularly that of the exposition, the path to *Structures* is evident. Not that I wish to suggest that Boulez leaned heavily on Fano's piece; indeed, it is obvious how much Fano had already learned from Boulez. Fano's development sections point backward rather than forward: the multi-dimensional serial writing of the exposition is taken as the starting point for the examination of "aspects" (that fatal word that so often separates the trees from the wood, and musicologists from historians) of the raw material, rather than the total reconstruction of language attempted in the second section of *Structures,* which still awaits a proper analysis.[26] Nevertheless, some of the later development sec-

[26] All the same, the abuse which has been hurled, with Boulez's sanction, at Ligeti's analysis of *Structure Ia* seems to have been accompanied by a singular lack of desire to do any better. Nor, apparently, has it occurred to any of these detractors to ask why as un-serial a composer as Ligeti should have made the analysis in the first place. The facts, as far as I can gather them, are these: In December 1956, Ligeti fled from Hungary, and early the next year he arrived, without possessions, in Cologne, where he stayed for some time at Stockhausen's home. At this time Ligeti had sketched *Apparitions,* but the works by which he is known today all lay some way in the future. He was invited to work in the electronic studio, and to help his material state Stockhausen, as co-editor of *Die Reihe,* suggested that he make an analysis of *Le Marteau sans maître.* Understandably, this proved too difficult, and since a Boulez article was needed for the "Young Composers" volume of *Die Reihe,* the simplest of the *Structures* was chosen instead (seen in this light, Ligeti's introductory reference to the "ramified complexity of the *Marteau*" is not without a

tions do point to the "preferential zones" found in the more evolved parts of *Structures*; such characteristics as simultaneous transposition of tempo (accel.) and dynamic (cresc.) without altering the relationship of individual values within this tendency (e.g., line 4 of the exposition) mark a considerable advance on the Messiaen study and Goeyvaerts' Sonata.

It's not difficult to see why this latter work has failed to survive as part of the 2-piano repertoire, even among specialists in new music. Nor is Fano's Sonata any match for *Structures,* though it has enough purely musical interest to sustain an occasional hearing. Musical history is full of examples to prove that historical importance doesn't always go hand in hand with musical quality, but that often relatively minor pieces are vital to our understanding of major ones. This much, at least, I hope to have shown in the present case.

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certain wry humor). In such circumstances, one should be surprised that the analysis is as useful as it is (certainly it has nothing to fear from comparison with most of the other analyses in the same volume).