***Musical Form and Transformations: 4 Analytic Essays* by David Lewin. New Haven: Yale University Press, 1994.**

Review by Bo Alphonce

This book is the first of what one would hope will become several large-scale applications of transformational network analysis. Lewin's preceding book, *Generalized Musical Intervals and Transformations,* provided the theoretical foundations in a pedagogically efficient—if terminologically heavy and mathematically demanding—framework. The new book makes reference to *GMIT*, as it has become known, but can very well be read without prior knowledge of the previous book; transformational operations are explained with great clarity and just enough theoretical substructure to carry the analysis. While thus not duplicating *GMIT*, it provides what the former book with its multiplicity of striking exemplifications did not offer, namely analyses of complete works.

The selections are intriguing. Each of the four works—Dallapiccola's "Simbolo" from *Quaderno musicale di Annalibera*, Stockhausen's *Klavierstück III*, Webern's Op. 10, no. 4, and Debussy's *Feux d'artifice*—is a member of a more or less tight-knit group of pieces. Accordingly, each of the analyses can be seen as a beginning and as a set of tools for further exploration of the respective compositional environment—and taking this as an invitation to the reader would seem to be in line with the pedagogical purpose of the book. Two of the works were written in 1911-13, and the approaching world war indeed enters into the Debussy analysis; the other two were written four decades later, bisecting the time span between the earlier pieces and the analyses. The two later pieces represent post-Webern but not Webern-influenced serialism and so, together, the four analyses underline the continuum from pre-serialist composition to post-serialist theory.

In order to discuss the four analyses critically, I find it

important to formulate what I understand to be some of their basic premises. One premise is that the principal purpose of the transformational network graphs is to arrive at an explication of the formal design. Another limits the scope of transformations to the pitch and pitch-class domains. A third concerns the method of analytical presentation: analyses are presented mostly linearly as if representing in slow motion a highly perceptive and intelligent listening. Accordingly, the theoretical apparatus at any given point in the analysis covers the piece only up to that point and grows only as the analysis proceeds. A fourth premise requires transformations to be defined within the specific musical context of the piece; in other words, the analysis is *ad hoc* in a totally positive sense. As a consequence, transformational labels often emphasize specific contexts over theoretical generalities.

Given these premises, following the analyses is not only captivating but exciting—at times even thrilling. The joy of intellectual play is never far from a good musical analysis, and one feels deep satisfaction when everything intuitively falls into place. With his finely tuned pedagogy, Lewin offers the reader many moments of brilliant insights and intellectual joy. All four analyses are impressive and revealing; they are also speculative in different ways, suggestive rather than definitive.

At the moment-to-moment level, the analysis of Dallapiccola's *Simbolo* registers the transformations of the twelve-tone thematic material from one statement to the next, not as twelve-tone row but as textural configuration. In each thematic phrase from the beginning of the piece, ten of the twelve notes form a homophonic progression in which one of the three implied voices articulates the B-A-C-H motif. The two remaining notes—the "odd-dyad-out" in Lewin's term—either form an ostinato pedal or begin or end a phrase. On the basis of patient and careful tracing of a listening process, Lewin builds two network graphs. The first of these covers the eight successive thematic statements of the opening section of the piece, up to the point where the tempo is slightly increased and the texture and configuration change (m. 17 in the score) such that the "odd-dyad-out" is absorbed into the

progression (while the B-A-C-H articulation remains prominent).[1] A T_7 relation from the first to the third phrase, articulated by exact pitch transposition of the progression, is one of the prominent features. Through retrograde orderings and inversion around the "odd-dyad-out" (in this case I_1, which keeps several of the compositionally articulated dyads invariant), the sense of T_7 is retained until the last statement. The second graph reveals a similar organization of the second section.

While the combination of the two graphs clarifies the relationship between the two sections, the brief return of the opening material is left out of the graph. In one of the finest sections of the analysis, Lewin discusses the return of the opening material. While there are invariant pitch configurations that could be heard as links to the final section, the opening ostinato returns "too soon" and thereby detracts from the links and creates a strong formal articulation.

Similarly, no transformation links the two graphs, and Lewin states convincing reasons for this. It is tempting to add that although the transformation that would link the first section's last statement to the second section's first statement keeps two segments invariant, these segments are too large and order-permuted to create any audible link between configurations that articulate mostly trichords and dyads. This, however, would mean introducing the twelve-tone row as a reference before it has been defined in the music. In the absence of a fully-established row order, Lewin defines all inversional transformations contextually. The inversion around the "odd-dyad-out" was mentioned above; a different inversion is defined to explain the transformation that links the first phrases of the second section (mm. 17-24 in the score). Lewin here partitions each progression into a linear pentachord and a heptachord that includes the B-A-C-H

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[1]My descriptive language is much less precise than Lewin's. It is meant only to guide someone who has the score at hand or give a general idea to someone who does not have the score.

motif. With this reading, the inversional transformation operates such as to preserve the pitch-class content of each partition. The compositional articulation at this point in the piece is not unambiguous, but Lewin's transformation reflects the only reading that achieves a plausible partitioning of the aggregate. Lewin labels this inversion "J" and the earlier inversion "I."

As mentioned above, a T_7 relation is prominent in the graph of the first section. The graph of the second section also includes a T_7 relation, but the sequence of transformations is slightly different. On the first graph, the T_7 relation holds from the first to the third phrase and is mediated by a RT_1 relation from the first to the second phrase and by a RT_6 from the second to the third. The second graph begins with the J inversion from the first to the second phrase and shows T_7 from the second to the third. Since the second section begins as inversion at T_0 of the first section, the impression of variation is strong. Is it possible, then, that the J inversion participates in successive transformations that somehow mimic more closely those of the first section than shown by the graphs?

The J inversion occurs about B or F. These notes occur in the music of the first phrase of the second section as the first upper note and the last lower note. For convenience, I am calling notes in such extreme positions "boundary notes." The first phrase of the second section, as Lewin points out, represents inversion around B♭ or E of the opening phrase of the piece. These notes are also boundary notes of the opening phrase and, by elision, of the entire first section. The axis notes of the J inversion are at T_1 relative to these. Similarly, the boundary notes of the second phrase, F♯ and C, are T_1-related to the boundary notes of the preceding phrase. But F♯ and C are also T_7-related to B and F, and they are preserved as boundary notes in the third phrase. Thus, in this particular relationship, the succession of transformations is T_1 from the first to second phrase, T_6 from the second to the third, and T_7 from the first to the third. I am not sure that Lewin would accept my reasoning here, but it seems that including them

would strengthen the sense of beginning a variation at m. 17.

Lewin points out how the absence of a defined referential row creates something of an uncertainty in the later part of the analysis. Inversion about the "odd-dyad-out" is difficult to apply when there is no clear articulation of that dyad. The fact that this is the inversional transformation between the two last phrases in section two, without as clear a contextual signal to the listener as in the first section, means that the need for the strength of a row reference is felt at that point. Thus, at the end of the piece the listener is left with the expectation of an unambiguous row statement.

The row the listener expects at that point should be, in Lewin's words, "something like" B♭-B-E♭-G♭-D-D♭-F-G-C-A-E. This, of course, is the row that is shared by *Canti di liberazione* and *Quaderno musicale di Annalibera.* Interestingly, Roman Vlad uses a slightly different ordering of the second hexachord: G-D♭-F-A-C-E.[2] As it turns out, the compositionally articulated invariances in *Simbolo* are more strongly supported by the invariance structure of Vlad's version. It is not clear what the analytical significance of this is, except maybe that Dallapiccola deliberately emphasized the "wrong" invariances in order to keep the curtain down until the end of the "overture." For whatever it is worth, this assumption works against Lewin's idea of the missing row definition. There are enough articulated invariances throughout the piece to build a sense of recognition of Vlad's ordering as "the row." Since the same relations are audible between the last two phrases of the second section and at the earlier I inversions, the sense of something missing would not be as pronounced for a listener who has arrived at an ordering

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[2]In Luigi Dallapiccola (Milan: Edizioni Suvini Zerboni, 1957), Ex. 33, p. 46, Vlad points out that the same row is used in *Canti di liberazioni*, yet presents two different versions. Equally confusing, Hans Nathan in his article on Dallapiccola in John Vinton (ed.) *Dictionary of Contemporary Music* (New York: Dutton & Co., Inc., 1974) claims the shared row to be an all-interval row although neither of the above versions is an all-interval row; instead, both are all-interval-class rows—somewhat less sophisticated creatures.

close to Vlad's row.

By its self-imposed limitations, Lewin's analysis of *Simbolo* necessarily leaves a number of other form-determining procedures out of the discussion. Phrase-structural considerations could lead to a formal design at least superficially in the vein of, or homage to, a Bach invention with its often dual statement of stable theme and mobile continuation on thematic material, followed by a phrase-structurally varied contrasting section and retransition to a brief return of the opening. But things like these belong to the reader's response to the implicit invitation to explore the music further. As it stands, "[t]he essay ... is a concise introduction to the issue of transformational form," as Lewin refers to it in his own introduction.

The analysis of Stockhausen's *Klavierstück III* derives the form of the piece from the transformational path of a single pentachord. The essay also puts special emphasis on the methodology of transformational analysis and makes two important excursions: one discusses Jeanne Bamberger's research on musical cognition in children, the other presents a critique of Nicholas Cook's analysis of the Stockhausen piece.[3] Lewin's point of departure is Jonathan Harvey's analysis in his monograph on Stockhausen's music.[4] The pentachord is [01236], Forte's pc-set 5-4.

In a refinement of one aspect of Harvey's analysis, Lewin traces successive, often overlapping and even simultaneous, forms of the pentachord through the thin texture of the piece, and in this way manages to account for every note. The analysis is summarized in two principally different network

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[3]Lewin refers to Jeanne Bamberger, "Cognitive Issues in the Development of Musically Gifted Children," in *Conceptions of Giftedness*, ed. Robert J. Sternberg and Janet E. Davidson (New York: Cambridge University Press, 1986), 388-413; and Nicholas Cook, *A Guide to Musical Analysis* (New York: George Braziller, 1987).

[4]Jonathan Harvey, *The Music of Stockhausen* (Berkeley: University of California Press, 1975).

graphs. One of these "narrates" the piece in temporal sequence, while the other maps a transformational space through which the graph traces a path, visiting and revisiting different areas in a way that models a formal organization with great clarity, stringent logic, and visual economy. The two graphing methods represent in their purest form two opposite approaches, both viable, but differing in their degree of sophistication. The strength of the spatial graph lies in its capacity to include varying amounts of alternative compositional possibilities inherent in the material and to map the actual path the piece makes among the possible routes.

In a brilliant discussion of Jeanne Bamberger's research on music perception, Lewin draws parallels between the responses of three different categories of listeners to a simple analytical task: arranging handbells to depict the melodic progression of "Twinkle, Twinkle, Little Star." The differing strategies used in these perceptual experiments offer striking parallels to Lewin's temporal and spatial network graphs. His definitive graph for the Stockhausen piece makes a creative compromise—also paralleled in the experimental responses—between the two graphing methods by traversing the spatial graph in several temporally successive passes.

The discussion involving these graphs makes the potential of transformational networks as analytical tools abundantly clear. Yet, Lewin declares his dissatisfaction with his own analysis. On this point I agree with him and find it ironic and a bit unsettling that a convincing display of the usefulness of the tool may be derived from a less-than-convincing analysis. The first gesture of the piece consists of a form of the pentachord mentioned above. The fact that several additional forms of the pentachord can be found in short order invites a continued search for the same pc-set. The search can be made by ear, and the result is attractive. One may compare the rotation of the pentachord to a prism bringing out different colors as its position changes. Lewin bases his analysis on twenty-one occurrences of the set, selected according to the criterion of note adjacency, to within one or possibly two skipped notes that are successive in the music. In fact, after

the first four set forms, all but one of the remaining occurrences are "porous," skipping at least one note. While this may be a minor weakness, more problematic in my view is the fact that all the occurrences, except the very first one, are at odds with the compositional grouping of the pitch material. As Stockhausen himself puts it, "Certainly the contact becomes harmonious only when the listener's intellect and perception both are equally satisfied."[5]

As Nicholas Cook indicates in the introduction to his analysis,[6] *Klavierstück III* is a difficult piece to analyze. In the early days it was no less frustrating. In preparation for their première performance by Marcelle Mercenier in Darmstadt 1954,[7] Bruno Maderna conducted a seminar on the first four of Stockhausen's piano pieces. According to Bengt Hambraeus,[8] who participated in the seminar, Maderna decided to begin with the piece that looked the simplest and chose *Klavierstück III*. After two hours' discussion, the seminar had made no progress. Asked to help out, Stockhausen replied that he did not remember how he had composed the piece. Indeed, he has not published an analysis of *Klavierstück III*, but he does point out its place as an integral part of the cycle *Klavierstücke I-IV*: while *III* may have been the first to be composed, Stockhausen places it between *IV* and *I* in terms of the development of his compositional technique from pointillism to

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[5]"Harmonisch wird allerdings der Kontakt erst, wenn Verstand und Empfindung des Hörers in gleichem Maße befriedigt werden." From "Gruppenkomposition: Klavierstück I (Anleitung zum Hören)" in Karlheinz Stockhausen, *Texte zur elektronischen und instrumentalen Musik*, vol. 1 (Cologne: M. DuMont Schauberg, 1963), 74.

[6]*A Guide to Musical Analysis*, 354ff.

[7]"[T]ransformed by the audience into a whistle concert of rare intensity," as Stockhausen adds matter-of-factly in *Texte* (vol. 2, p. 19; "vom Publikum in ein selten intensives Pfeifkonzert übergeleitet").

[8]Personal communication.

Gruppenkomposition.[9] Since *Klavierstück III* shows more structural affinity with *I* than with *IV*, some of Stockhausen's analytical comments on *I* may also be applicable to it.[10]

The search for regularity, similarity, and symmetry is characteristic of most analytical approaches, including those of *Klavierstück III*. Analytical reduction of the piece to a plausible formula brings intellectual satisfaction. But what if perception runs counter to the formula? And what if the formula itself is dissatisfying? Typically, analyses of this piece start out well enough, but as the piece proceeds they deteriorate and become forced. Central tenets in Stockhausen's analysis of *Klavierstück I* are the primacy of the *group* (meaning roughly a brief segment of the composition whose individual structural characteristics differ from those of other segments) and the *total absence* of regularity and symmetry. Similarity occurs between segments on a high level of perceptual complexity: "No repetition of an already presented group in the sense of thematic correspondence, no variation in the sense of Gestalt variation or development: rather a correspondence in the *nature of structural interrelations of elements* in time ... and *space*...." And further: "It is essential in this that we are becoming aware of different *degrees of the structural transformation*...."[11] Whether or not one accepts Stockhausen's analysis at face value, it does address the listening process. In the present context, it suggests that tracing degrees of complex structural

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[9]*Texte*, vol.1, 72f and vol. 2, 19.

[10]*Texte*, vol. 1, 62-74. It should be mentioned that Jonathan Harvey tends to dismiss Stockhausen's analysis as "more wishful thinking than reality" (*The Music of Stockhausen*, 23).

[11]"Keine Wiederholung einer schon dagewesenen Gruppe im Sinne einer thematischen Entsprechung, keine Variation im Sinne einer Gestaltvariation oder Durchführung: vielmehr eine Korrespondenz in der *Art der strukturellen Elementverbindung* zeitlich ... und *räumlich*...." "Wesentlich ist dabei, daß uns verschiedene *Grade der strukturellen Transformation* bewußt werden...." (*Texte*, vol. 1, 69f; original emphases.)

transformation at the perceptual level could offer transformational network analysis a challenge more commensurate with its considerable potential than the cobbled path of a single pentachord.

Actually, the only analysis of *Klavierstück III* that comes close to Stockhausen's analytical approach is Cook's, and in that light I am surprised by the acerbity of Lewin's critique. To take an example, Lewin quotes Cook's assertion that "the three sub-groups cohere *because of* the inverted arch shape" and asks, "*Do* arch shapes create coherence in Stockhausen? In any art? For aesthetic reasons? Psychological reasons?"[12] After discussing the ascending direction of group one of *Klavierstück I* and the descending direction of group two, Stockhausen states, "Together, the first and second groups can now be perceived as one formal unit: rising-falling shape of motion."[13] In fact, Cook gets so close to Stockhausen in both reasoning and terminology that I must assume direct influence, although he makes no reference to Stockhausen's *Texte* (which had appeared in print more than twenty years earlier). What Lewin reacts against in this quotation is the claim of causality between arch shape and coherence. Stockhausen does not use a causal expression explicitly, but his ':' is eloquent enough. If my assumption of direct influence is correct, Cook's language can be understood as that of an apprentice. In his case, as well as in Stockhausen's, it would be possible to place "Listener Report" as a kind of key signature in front of the analysis and read "arch shape causes me to perceive coherence." By and large, I would think one does this more or less automatically. However, as it stands, Cook's analysis undeniably uses quasi-scientific generalizations to express what are more likely his personal

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[12]Lewin, 56; his emphasis.

[13]"Erste und zweite Gruppe zusammen können jetzt als eine Formeinheit empfunden werden: steigend-fallende Bewegungsform...." (*Texte*, vol. 1, 64.)

perceptions. Seen as a reaction against less-than-stringent musical discourse, I certainly find Lewin's critique timely and important.

With a graceful bow to Allen Forte, Lewin uses Forte's analysis of Webern's Orchestral Piece, Op. 10, no. 4,[14] as a point of departure for an elaborate, and in many ways fascinating, set-theoretic study of the work. After explicating it on the basis of transformations of Forte hexachord 6-z43[012568], including several contextually defined inversional operations, he explores the "stories" of other prominent pc-sets through the piece. One especially intriguing section of the analysis demonstrates two trichordal derivations (in the twelve-tone sense). It might be far-fetched to claim any extraordinary significance of trichordal derivation this far ahead of Op. 21, and Lewin does not attach any significance to it outside the work itself. Nevertheless, the question is implied. He then makes comparisons with procedures in several of the other pieces in Op. 10. The essay offers a wealth of analytical discoveries and observations, presented with Lewin's usual elegance and clarity. The analysis is provocative enough to be felt, again, as an invitation to continued exploration.

The main question the Webern analysis triggers in my mind is where one draws the line between observations supported by compositional articulation and those one makes simply because they are there, inevitably, as system properties. This is not the same as the line between audible and inaudible relations; it is possible to hear much more than what is articulated on the surface of the piece and the line can be pushed by purposeful ear training. Actually, five and a half seconds into the piece—when the mandolin has played its hexachord and the harp its trichord, the viola and clarinet have begun their extended notes, and the first trumpet note has been heard—all 4095 unordered pc-sets are there, available

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[14]Allen Forte, *The Structure of Atonal Music* (New Haven: Yale University Press, 1973), 89ff.

for analysis. In this wealth of possibilities, which analytical choices are in some sense explanatory, which ones are coincidental? What do we mean by "explanatory" or "coincidental"? It cannot very well depend on what we believe the composer intended: for so long now the "intentional fallacy" has been drummed into our minds that the composer, like the rest of us, has become just another bystander, curious about the work.[15]

The way I read Lewin, the more interesting question is not whether the analysis suggests how the work may have come about but what coherent analytical paths it supports. The analysis is listener-oriented, a challenge and invitation to fellow listeners: "Can you hear it the way I hear it?" Typically, different paths coexist, and the listener, Lewin included, comes out of any one of them more or less satisfied, sometimes with an intuition about how the work may have been composed, but this is a side effect, not the purpose. It is also performance-oriented, not only in the sense of giving helpful hints about technical problems, but also in the sense of bringing out a particular hearing. Even from this angle, though, the work is free-standing, without support other than the printed score, a sometimes fragile base.[16]

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[15]To return for a moment to Stockhausen, at the end of his analysis of *Klavierstück I*, he says, "One could now easily get the impression that I composed the first piano piece in 1952 the way I have described it here. That is not at all the case. ... The concepts I have used here I found much later...." ("Es könnte nun leicht der Eindruck entstehen, als hätte ich das erste Klavierstück in 1952 so komponiert, wie ich es hier beschrieben habe. Das ist ganz und gar nicht der Fall. ... Die Begriffe, die ich hier verwendet habe, fand ich erst viel später...." *Texte*, vol. 1, 74.) I would still like to think that the way Stockhausen found the later concepts useful says something very essential about the piece and that his analysis therefore is not just one among many equally possible analyses.

[16]Bengt Hambraeus tells me about the first performance of Webern's Op. 27 in Darmstadt 1951, where he and other listeners were baffled by Peter Stadlen's romantic interpretation. Stadlen was Webern's student and played according to the Mahler-like performance instructions Webern himself had penned into the score, the ones we now find in the second edition (after they were left out of the first edition, maybe under the influence of clinical *Bauhaus* aesthetics). Tradition dies fast; fortunately, the Op. 10 score

To aid the following discussion, a simple representation of the score is provided as Figure 1. Pc-set 6-z43 is formed by the first three notes of the mandolin and the trichord of the harp. Lewin shows how several statements of this hexachord and its complement cover the piece, then selects four statements of the hexachord as the principal ones. These relate to each other by successive contextually defined inversions about notes that are prominently present in the texture, partially outside of the four hexachords. Each hexachordal statement embeds a single pentachord as a contiguous subset. Similarly, each statement of the complementary hexachord articulates one contiguous pentachord. These 6-z43 hexachords, their complements, and embedded pentachords all follow the same transformational path of successive inversions. The network graph depicting this series of transformations is expanded to account for a parallel transformational process which further enhances the transformational progression. This parallel progression, however, consists of set forms that, in my view, exist as secondary results of automatic invariance relations among the main sets in Lewin's reading. Thus, their transformational path is automatically the same as that of the main sets.

Having established this network, Lewin then demonstrates two trichordal derivations in which the interrelations among the trichords engage the same inversions as the network. In both derivations, the trichords combine into hexachords other than 6-z43. One of these articulates a third pentachord which is also supported by the original hexachord, and therefore follows the same transformational path as the network. On the basis of several occurrences of those sets in Op. 10, no. 3, he now makes connections between these two pieces; including the first pentachord, he extends connections also to no. 1.

What has been summarized is an example of an intensive and very impressive application of transformational analysis to pc-set relations. In Lewin's characteristic style of reasoning,

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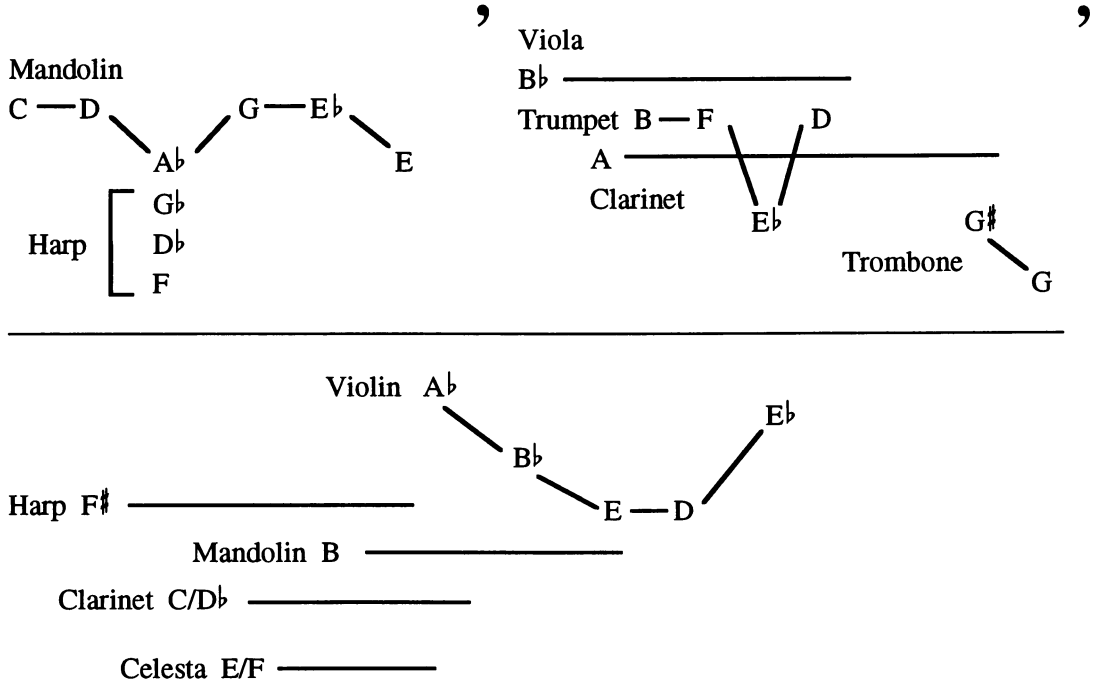
preserves the expressive range that gives the Five Pieces for Orchestra the character of Mahler "concentrates."

Figure 1. Pitch-class score of Webern, Op. 10, no. 4



the analysis is presented very much as a proposal, a contribution to a continuing discussion, and whenever an analytical hypothesis runs into problems, its potential and *raison d'être* are evaluated with great finesse. In the same spirit, I shall pursue a different analytical path through the piece. It does not engage Lewin's inversional transformations but connects with his analysis on other points. It is not nearly as intensive and penetrating, but is included to draw attention to a couple of points I find worthwhile.

In all its thoroughness, Lewin's analysis never treats the first linear hexachord as one entity. Since it offers itself as source material even more immediately than the 6-z43, its role in the piece may be worth exploring. The mandolin's C-D-A♭-G-E♭-E forms the hexachord 6-16[014568] and the remainder of the first aggregate forms its inversion about C/D♭ or F♯/G: (F D♭ G♭)-B♭-A-B-F (the reason for including the final F will become clear). This comprises the harp trichord, the extended notes in the viola and clarinet, and the first two notes of the trumpet. The extended A serves as pivot tone for the third statement of 6-16, extending through the remainder of section 2 and including the first note of section 3: E♭-D-A-G♯-G-F♯. This statement transposes the second hexachord by T_9 and inverts the first about F or B. The harp's F♯ now becomes the pivot between the third, fourth, and fifth statements. The fourth extends through the dyads of the clarinet and the celesta and includes the first note of the violin: F♯-(C D♭)-(E F)-A♭. It transposes the third hexachord by T_{10} and inverts the first about E or B♭. It bypasses the B in the mandolin; the significance of this moment of uncertainty will be discussed. The harp, the mandolin, and the remaining violin notes combine to form the last hexachord: F♯-B-B♭-E-D-E♭. Its relationship to the fourth hexachord is again T_{10} and to the first, inversion about E♭ or A.

Like the complete array of forms of 6-z43 and its complement, this succession of 6-16 forms accounts for every note of the piece as long as the inclusion of the trumpet F in the first aggregate is accepted. It shares three of the inversional axis pairs with Lewin's network but does not apply

them in the same order, nor between successive statements except the first two. For each of the axis pairs, it holds that they are texturally exposed in different ways. G (trombone) and F♯ (harp) end and begin their respective sections and are followed immediately by C and D♭ (celesta). F is the lowest note in section 1, B the last extended note in section 3; the same pcs begin the trumpet line in section 2. E is the last note in section 1, B♭ the first note in section 2; the same pcs are adjacent in the violin line. A is the one unique pitch (clarinet) and E♭ (trumpet) sounds against it as the lowest note in the section up to that point; E♭ also ends the piece.

Because of the uniqueness of A, it is necessarily included in any aggregate. In my reading, the second section and everything in the third section up to the violin solo forms the second aggregate, overlapping the end of the first aggregate by its first four notes. The last three notes of the second section combine with the third section to form the third aggregate. For all three forms of 6-16 in the last two sections, however, their complements are poorly articulated and do not figure in the analysis.

As it happens, each of the 6-16 statements articulates a form of one 5-6[01256] pentachord as a contiguous subset, just as 6-z43 does in Lewin's analysis. Lewin labels the pentachord X; for convenience the same label is used here. In the following illustration, brackets show how X is contained in the different statements of 6-16, labeled H1 through H5.

H1: C [D A♭ G E♭ E] H2: (D♭ [F G♭) B♭ A B]
H3: B♭ [E♭ D A♭ G F♯] H4: [F♯ (C D♭) (E F)] A♭
H5: F♯ [B B♭ E D E♭]

Three occurrences of 5-6 as a subset of 6-16 coincide with Lewin's X as subset of 6-z43; the other two bridge sections. The total of nine occurrences of 5-6, embedded in a statement of either 6-z43 or 6-16, covers the piece, except for the first note of the violin, A♭. For that note to be included in a form of 5-6, A or G or both would have to be available, but these are precisely the notes missing from section 3.

Set-class 5-6 is a subset of seven different hexachords: 6-z3[012356], 6-z4[012456], 6-5[012367], 6-z6[012567], 6-16[014568], 6-z43[012568] and 6-z44[012569]. While the first four can be construed in sections 1 and 3 and 6-5 in section 2, 6-z43 and 6-16 are the only hexachords sufficiently well articulated in all three sections to invite analysis. 6-z44, the "Schoenberg" (Es-C-H-B-E-G) hexachord, cannot be formed within the pitch-class contents of either section 1 or 2; however, it can technically occur in section 3 and does so at an interesting point.

Following section 3 from moment to moment, the harp, clarinet, and celesta together build a form of 5-6. The next note, the mandolin B, completes neither 6-z43 nor 6-16; instead, the total pitch-class content before the violin entry forms 6-z6. This is the first well-articulated statement of that hexachord; its significance in the course of 6-16 events is uncertain. As we have seen, the first violin note completes 6-16 together with the initial pentachord. However, as the harp F♯ ends, it leaves another form of 5-6 sounding, including the "uncertainty" note B. When the violin enters, it completes a form of 6-z44 with this pentachord, the first and only occurrence of that hexachord in the piece. Why would it occur here? Since there is no reference for it within no. 4, it may refer to one of the other pieces. In fact, the violin solo at the end of Op. 10, no. 1, forms 6-z44. Nos. 1 and 4 were both written in 1911, before the other Op. 10 pieces. The quickly vanishing presence of 6-z44 in no. 4 may be too faint an echo to serve as the "Erinnerung" of the "Urbild," but it happens at a point where listening focus has been sharpened and the violin sound brings it about.

Of course the mandolin B also participates in the final hexachordal statement, whether it is 6-z43 or 6-16. Now, in a bit of speculation, if the violin A♭ were to be replaced with the missing G, the final six notes of the piece would form 6-z44 instead of 6-z43. The G is not only the final note of section 2, it is also the final note of the violin solo in no. 1, and so is missing in a conspicuous and significant way. Clearly, of the well-articulated hexachords in Op. 10, no. 4, 6-z43 is the

stronger analytically, but I believe 6-16 also belongs in the story. There appears to be a gradual change in their relationship: after the clear articulation of 6-16 at the beginning of the piece, 6-z43 emerges as the better-articulated hexachord at the end. In this connection, it is especially interesting that the two hexachords can be seen as equidistant from 6-z44: if we juxtapose such forms of the three hexachords that 5-6 is held invariant, the remaining pcs of 6-z43 and 6-16 are symmetrically equidistant from the remaining pc of 6-z44:

6-z43:	C	D♭	D		F	G♭	A♭				
6-z44:	C	D♭	D		F	G♭		A			
6-16:	C	D♭	D		F	G♭			B♭		

This grouping of closely similar pc-sets is a familiar characteristic of Webern's pre-serial works and represents a kind of inter-pc-set transformation that could probably be particularly well represented in a transformational network.

Whether this brief analytical exercise has contributed anything besides what Lewin has already offered in his "depth charge" into Op. 10, no. 4 is for the reader to decide. But it has illustrated one characteristic of pc-set analysis that always leans toward the speculative: the continuous probing beyond surface articulation. It is often revealing and necessary for analytical coherence, but it may leave the ear behind, and when it amounts to bringing out relations that are inherent properties of the twelve-tone system, it may result in tautology. The temptation is also always there to force the piece into a neat and appealing analytical scheme—somehow to square the circle. Lewin's analysis never forces the piece, although occasionally a line extended into the rich network of twelve-tone relations—fascinating in its own right—appears tangential.

The Debussy analysis must be read. It is a virtuoso analysis of a virtuoso piece. The piece is fireworks; so is the analysis. It combines pitch transformations within different scales and tonalities with long-span motions and connections

in ways that bring brilliant clarity to form and progressions and therefore should be required reading for pianists preparing a performance. It differs in two principal respects from the other analyses: before explicating the piece in linear sequence, it refers to the final moments of the piece as a central problem to be addressed; it also makes a reinterpretation of the significance of these final moments in the historical situation. If I have a single question here, it does not concern the structural analysis, but the parallel plot of extra-musical meaning that Lewin proposes. The conflict between opposing forces "en blanc et noir" is well argued with reference to World War I looming at the horizon. It elevates the final quotation from the Marseillaise from faint echo of National Day festivities to the status of a genuine call to arms. To my ears, the context is wrong. The twelfth in a series of amiable preludes calls citizens to arms in a whisper? Even though it is persuasively argued, the conclusion cannot be anything but hypothetical. Having made this conclusion, however, Lewin turns it against Debussy: "I cannot share the militant nationalism of Debussy's personal thoughts." Is the intentional fallacy here intentional? What we know of Debussy's personal thoughts from his letters show just the readiness of a sick and elderly man to defend his country. Yes, he is a *musicien français*, patriot, and nationalist, but a militant? This question aside, I find the chapter exciting reading, refreshingly provocative.

Contextual definition of transformations has analytical strength; it provides tools that are both precise and flexible. At the same time, their place and relations in general twelve-tone theory are not always made obvious. It would help to find occasional bridges between specific transformations and general theorems. Sometimes the analytic reasoning becomes so context-specific that twelve-tone generalities are virtually screened out. Balancing the two aspects would cost some verbiage, but would ease comparisons and communications, just as trading in the same currency does.

My old harmony text, written by my late teacher Sven E. Svensson, then Director Musices at Uppsala University,[17] has on p. 116 a transformational graph, much like Figure 7.9 in *GMIT*. It registers the successive reinterpretations of chords in a harmonic progression in a hypothetical listening situation, a bit like what happens during the first chords of Beethoven's Symphony No. 1 and what Lewin discusses in connection with the Minuet of the same symphony. Clearly, transformational networks that reflect the interaction between a listener's stylistic preconditioning and a performance in progress are an intriguing and entirely realistic possibility.

To carry this kind of analysis into post-tonal music would be a challenge. Stylistic shifts have happened so fast and frequently that there has been little chance for listener preconditioning. Yet, post-tonal composers have indeed played on listener expectations. Webern's relation to Mahler and Zemlinsky is just one example. It would be fascinating if it were possible to reconstruct from the way a later composition differs from slightly earlier works within the same stylistic current, the set of listener expectations the piece assumes and plays on. Lewin at times touches on this possibility in his analyses, more as a report of his own expectations than of any hypothesized expectations of an abstract listener. But just as it is possible to trace a moment-to-moment listening path through a piece without reference to its continuation, it should be possible to analyze, for instance, Webern's Op. 10 without engaging one's experience of later music. This kind of very close, if hypothetical, search for the historical conditions under which a composition and its first listeners interacted could yield much insight, and transformational analysis would have the tools for it.

The tools applied in *Musical Form and Transformations* suggest a versatility that reaches far beyond the four analyses presented in the book. As yet, transformational analysis is at

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[17] *Harmonilära*, with C.-A. Moberg (Stockholm: Gehrmans, 1933).

the beginning of its development, and it remains to be seen whether it will take hold as one of the important currents in music theory. With its pedagogical strength and theoretical accessibility, *Musical Form and Transformations* represents an important step in that direction.