

A New Way of Measuring

Musical Affect

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It is generally acknowledged that the most successful and thorough-going analyses are those which include evaluation as well as description. Although a descriptive analysis may follow from observations made about some musical object, mere description is not enough. To describe events through the collecting of data is only a means to a further goal—to evaluate events through the processing of all data.

In view of the above, my object is double: 1) to investigate the handling of specific, chosen events in a selected work and to describe them through classification, and 2) to evaluate such events according to a unique and original system of measurement. Specifically, this study proposes a new system of statistical measurement-evaluation of musical affect, applicable to any music whose content is significantly comprised of recurring elements. The object of demonstration, Symphony No. 2 by Roger Sessions, is chosen because it contains a great number of recurring events.

The paper is presented in four parts. I) First, discussion will center on what I call recurring event-groupings: two or more dissimilar ideas, e.g., dissimilar motives or themes, are adjoined or superimposed to form compounds which recur throughout a movement. As the events within one compound are similar to events within another, their kinship is that of a relationship—a correspondence or association. An association is formed by the return of some previous activ-

ity-consummated with the arrival of a second event-grouping after some time lapse. Such associations may define formally strategic points: many not only define salient locations at a work's highest hierarchic level of the section, but define less obvious locations at the two lower levels of the subsection and phrase. By way of illustration, some typical examples of associations will be shown to function as a formal feature and structural device in movement I.

II) Second, it will be explained how each association contributes to a determination of the extent of formal order. The elapsed time between an association's two points of occurrence constitutes a temporal proportion (the durational length of a temporal span). As such proportions transpire on various structural levels, they can be compared, revealing how uniform or imbalanced a piece is with respect to a grouping's position in time.

III) Next, the extent of order (uniformity vs. imbalance) is statistically measured. Values applied to such measurements are derived from the statistical method of least squares. The method allows for the predicting of future points of occurrence via the constructing of a least square line, the function of which is to provide a trend to which all future points can be measured. Any expected point of recurrence can be predicted if the temporal position of two past points is known. By comparing the placement of the predicted point to the actual point, the difference (deviation) can be quantified and expressed as a numerical value. Each value is a function of the probability of when the expectant grouping recurs: our perception of when and on what level groupings occur provides the basis for analysis, revealing the relation between a grouping's formal position and its point in time relative to other groupings. The method will be demonstrated by its application to the previously considered series of associations.

IV) Recalling that associations are conceived as strict objective and measurable data, the remaining section shows how they can be perceived as experientially meaningful, providing a basis for their measure as affective content. Numerical values derived from measurement are interpreted as indicators of musical affect. Since each grouping's point of occurrence provides a measure of deviation from the expected in reference to its temporal placement, each is viewed as a unique source of affect.

As said, the analysis can be applied only to a work which consists of recurring elements. Accordingly, a work by Sessions was chosen for three reasons. 1) Although performances of Sessions's music have been extensively reviewed, little literature is available that discusses his music in any great detail. In particular, there are no major studies on Symphony No. 2. 2) Much of Sessions' music consists of a unique type of recurring gesture—the aforemen-

tioned event-grouping. 3) The temporal placement of such groupings at hierarchic levels bears upon the depth of structural relations which inform a piece. Sessions' music typically reveals a hierarchic ordering: functionally distinct sections, subsections and phrases establish a differentiation between parts.¹ By noting upon which level a grouping situates, we can determine how a work is formally arranged into parts, and ascertain the relation of those parts to any one grouping.

Further, there are three reasons why Sessions' Symphony No. 2 (1944-46) was chosen as the piece from which the examples are extracted. 1) It is rich in temporal relations stemming from the placement of event-groupings at various levels. 2) It is typical of most of Sessions' output with respect to stylistic traits. This suggests that the work is neither anomalous nor exceptional in its analytic potential. 3) It is considered to be one of America's most competently written atonal symphonies (in its successful reconciliation of large-scale writing within a nontonal idiom).²

¹Of course, this all-too-familiar interpretation of hierarchy is a simplistic one for it does not take into account features found in a legitimate hierarchic organization. For instance, in a true hierarchic system, the upper level exerts a constraint or control on the behavior of events at lower levels. Musically, the movement or placement of event-groupings at lower levels would be determined or controlled by the movement and placement of groupings at upper levels. In Sessions, there is no evidence of such a "control authority." Suffice it to say that the term "hierarchy" is used here only in the broadest sense primarily for the sake of analytic convenience.

²Several writers confirm this point. I include statements by two: "I must say here and now, unmistakably, that the Second Symphony is one of the best symphonies any American has ever written." See C. Smith, "Mitropoulos leads Premiere of Sessions' [sic] Second Symphony," Musical America 70 (January, 1950), p. 57. Or: "This work is certainly among the best atonal symphonies written in America, or for that matter, anywhere else." See Peter Fona Korn, "The Symphony in America," in The Symphony: Elgar to the Present Day, Vol. II, ed. by Robert Simpson (Baltimore: Penguin Books Inc., 1967), p. 261. I might add that the work earned the Naumburg Musical Foundation Award in 1949 and the New York Critics' Circle Award in 1950.

PART I

First shown is a series of groupings at the sectional level. (See Example 1.) Shown are theme al (Vln. I) and its affiliate, chord av (W.Winds, Hns. I-IV). Al is chromatic, courts few tonal implications, and is not strongly suggestive of any meter. Its overall descending shape is controlled by numerous zig-zag figures of abrupt wide intervals, and held within a frame of running sixteenth notes.

The theme is stated with chord av. Although most associations in Sessions involve motives and themes (omnipresent features of his linear-oriented style), some occasionally include chords. Such is the case here. Av contains three two-note clusters, each separated from a member of its closest dyad by a minor sixth or perfect fifth. An isolated pitch, (in this case, D6), not a member of a cluster but separated from its closest dyad by a perfect fifth, completes the chord's identity. Upon each recurrence, these internal properties are preserved.

The position of each grouping is further viewed against the background of an expanded sonata design; as shown in Example 2, each al-av coupling defines a boundary point at the head of a section.³ (The number below each measure number indicates the chronometric measure in seconds at which a grouping occurs. It represents a measurable quantity used in the forthcoming evaluation.) Obviously, these examples are not unusual or infrequent. Many pieces which similarly rest on Classic or Neo-Classic foundations contain sections which correspond through common material. Many, e.g., may commence with a similar context or project a similar placement of events.

That the use of recurrent groupings is continued as a structural device on the subsectional and phrase levels, however, is of more interest: al-av recurs at the subsectional level. (See Example 3.) A descending fragment in the violin is a simple modified repetition of al, and pitch elements of av bear a similar relation to their original form. The grouping is considered to be at the middle hierarchic level because it establishes a clear-cut boundary point, partitioning off the beginning of the quasi-development, a

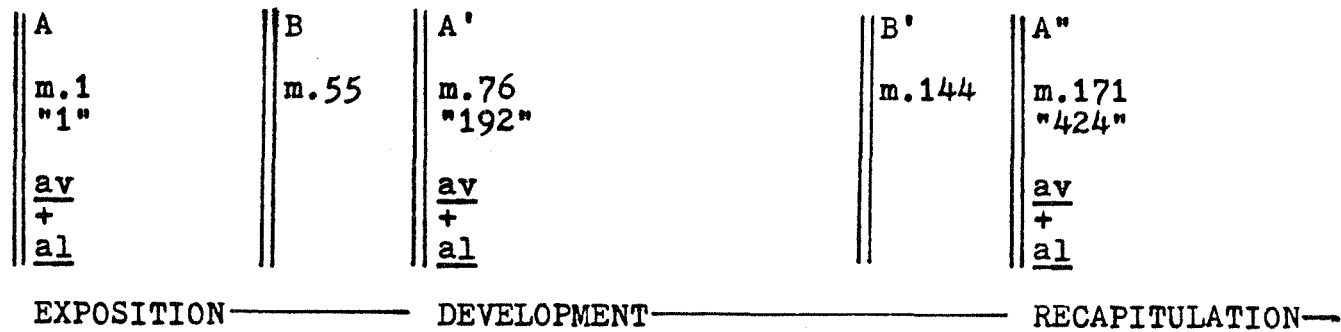
³Movement I is divided in to five sections: A-B-A'-B'-A''. The first two contain contrasting themes which function as first and second subject groups, respectively. The third and fourth sections develop this material; the final section is a recapitulation of events from the first section. This approximates a sonata design.

Example 1. Sectional Level: Chord av, Theme al.

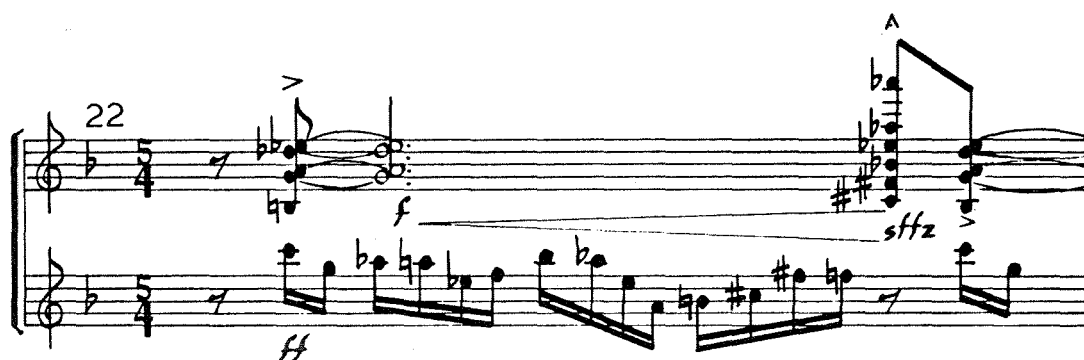
The musical score is divided into three systems. The first system shows a melodic line in the upper staff and a bass line in the lower staff, both in 4/4 time. The second system, starting at measure 76, shows a more complex texture with multiple staves. The third system, starting at measure 171, shows a melodic line in the upper staff and a bass line in the lower staff, both in 4/4 time. The score includes various musical notations such as notes, rests, and dynamic markings like *ff*, *p*, and *mf*.

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Example 2. al-av Couplings in the Expanded Sonata Design.



Example 3. Subsectional Level: Chord av, Theme a1.



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smaller segment (a subsection) within the first section.⁴

Finally, three remaining pairs occur at the level of the phrase. (See Example 4). Example 5 shows the relative placement of all seven statements.

To complete the description, the three low-level compounds not only initiate phrase structure (similarity of function) but the internal placements of two (m. 99 and m. 22) coincide: both recur at identical moments within their respective sections, maximizing their relatedness. The recurrence at m. 112, however, is at a location which does not align with the previous two groupings.

A final point: these groupings would not be significant were it not for their frequency of recurrence; their recollection at various levels tends to reinforce the identities of events within—the listener almost expects certain events to be linked.

PART II

As shown, certain locations are defined by the recurrence of the same events. Insofar that such events locate on all three levels, a work's interior proportions are revealed. A proportion is the span of duration between any two successive points. Looking at a work's parts in terms of its many

⁴This sector (mm. 22-54) is referred to as a quasi-development because developmental procedures are carried out there on a much lesser scale than those procedures applied within section A'.

Example 4. Phrase Level: Chord av, Theme a1.

24

99

112

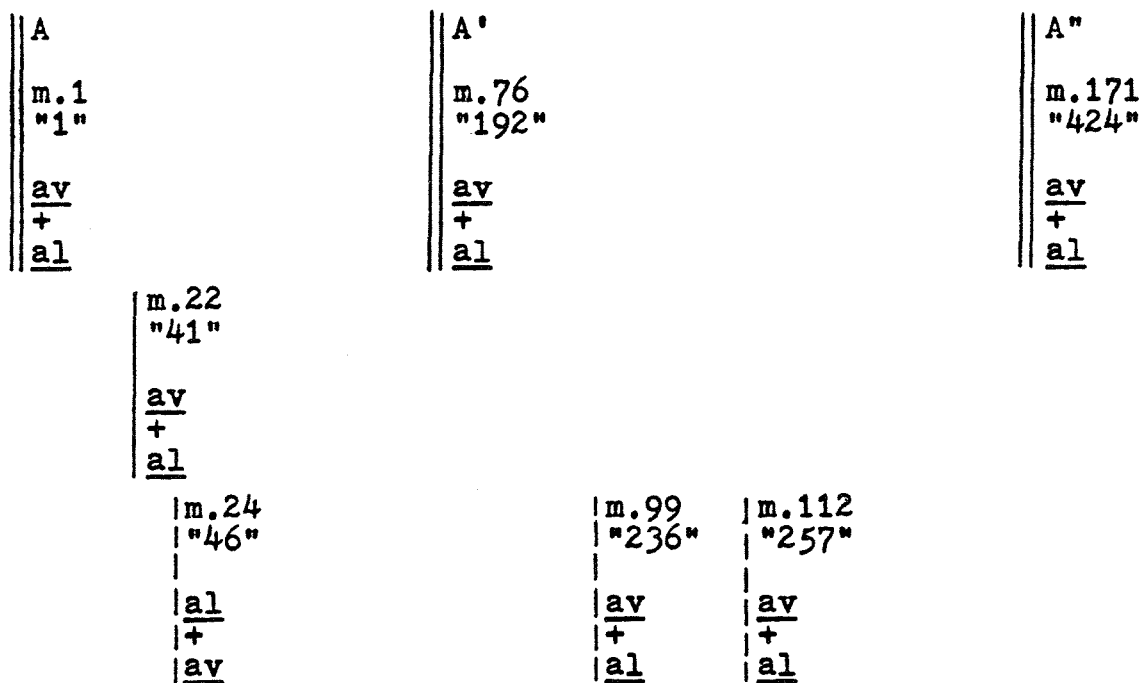
ff

ff

sfz-ff

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Example 5. Relative Placement of Statements
of av and al.



temporal proportions is one way of viewing its hierarchic structure, the extent of uniformity/imbalance of parts. We may note also that duration is experienced through periodicity and change. As event-groupings enter at points of musical change, their enclosed spans are perceived durationally. Formal order thus is defined as the measureable degree of proportion of regularity between recurring groupings that situate on structural levels. To quote Abraham Moles: "The amount of periodicity is a degree of order in temporal organization."⁵

Summarizing, the placement of event-groupings influences how we experience relations in time. Such relations are

⁵Information Theory and Esthetic Perception, trans. J. Cohen (Urbana: University of Illinois Press, 1966), p. 69.

determinate as to time length and can be analyzed as time-spans, each of which commences with some grouping. Hence, relations between groupings can be defined solely in regard to temporal proportions—the product of an event's unique location or placement in relation to other events. A demonstration will now show how musical structure can be conceived objectively through measurement.

PART III

Two methods of measurement are to be enacted; they are outlined below:

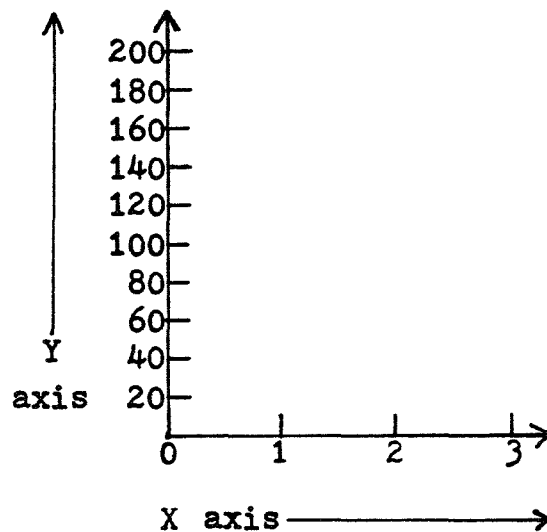
METHOD I: three or more points considered cumulatively one at a time, in a succession of points.

METHOD II: all points (three or more) considered as a whole.

METHOD I

For each pictorial representation of the variables used, a rectangular coordinate system is adopted. (See Example 6.)

Example 6. Rectangular Coordinate System.

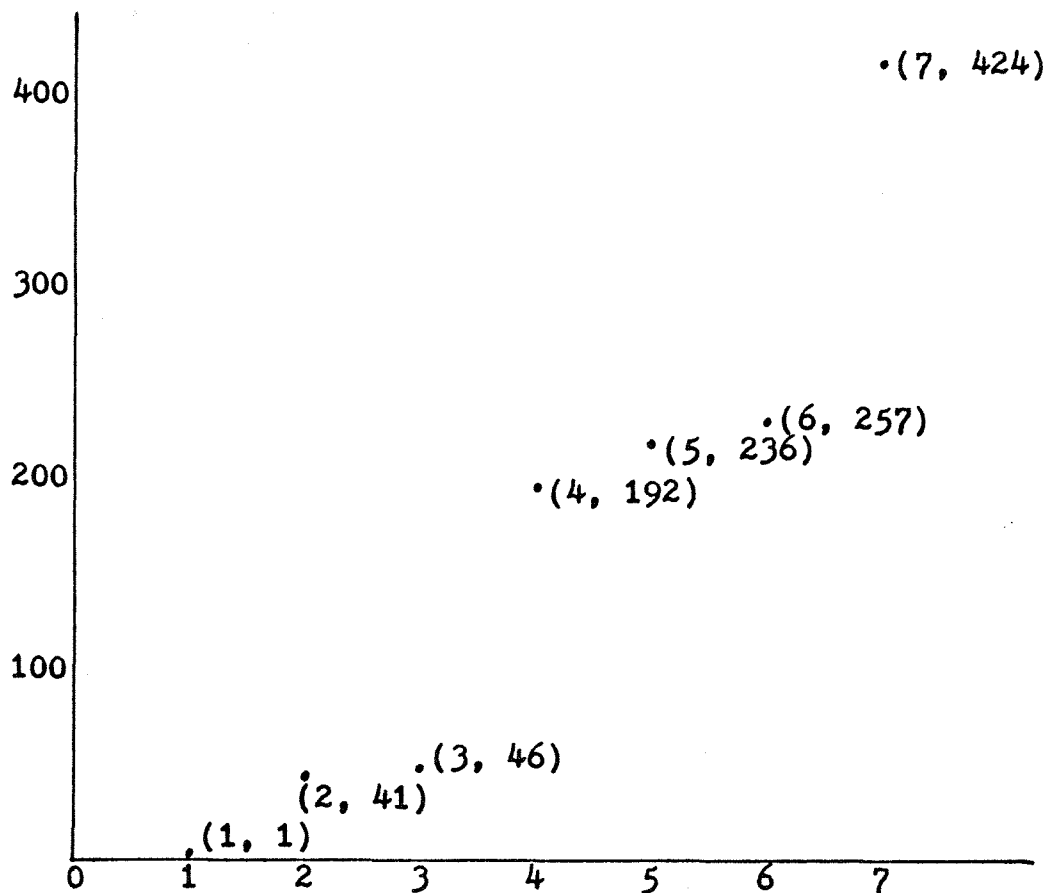


The vertical axis (Y) is a time-line, divided into equal segments or units; each increment is equivalent to twenty seconds. Points or coordinates placed on this axis signify temporal placements of an event-grouping. (Sessions' tempo indications were accepted and taken literally so that each grouping's position—as measured in seconds—could be determined.)⁶

The horizontal axis (X) indicates the order of entrance for each grouping. A relation is assumed to exist between points on X and analogous points on Y.

Using the data from the previous three illustrations (see Example 5), the seven statements are plotted in Example 7.

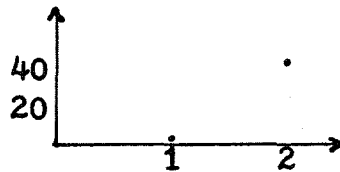
Example 7. Plot of the Seven Statements.



⁶Sessions' tempo markings are generally confirmed by the one available disc-recording, performed under Dimitri Mitropoulos by the New York Philharmonic on the CRI label.

The scheme of measurement is as follows. 1) The initial association-points (1,1) and (2,41)—is plotted and all values are entered into a summation table. (See Example 8 and Example 9, respectively.)

Example 8. Plot of Initial Association.



Example 9. Summation Table.

X	Y	X ²	XY
1	1	1	1
2	41	4	82
$\Sigma = 3$	42	5	83

2) The resultant summation values for X, Y, X² and XY are inserted into the equations:

$$\begin{aligned}
 Y &= a_0 N + a_1 X & 42 &= 2a_0 + 3a_1 \\
 XY &= a_0 X + a_1 X^2 & 83 &= 3a_0 + 5a_1
 \end{aligned}$$

These are called the normal equations for the least square line. The intent is to solve for constants a₀ and a₁. "N" is equal to the number al-av statements that are momentarily being considered for immediate measurement ("2").

3) Solving for constants a_0 and a_1 , the results are:

$$a_0 = -39 \qquad a_1 = 40$$

4) These values are inserted into the equation:

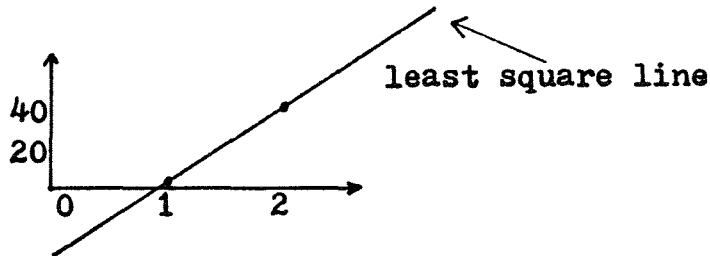
$$Y = a_0 + a_1X \qquad Y = -39 + 40X$$

This is called a least square equation. It expresses a mathematical relation between all present and future points for variables X and Y.

5) Next, values for Y are computed by inserting values for X. For example, when $X = 1$, $Y = 1$; when $X = 2$, $Y = 41$. It is understood that X is the independent variable, Y is the dependent variable. (The value of Y is dependent on the value of X.) Although these roles can be interchanged, it is common statistical practice to consider X as the independent, Y as the dependent variable.

6) After the two values are plotted, a line connects both points (see Example 10). This line is called a least square

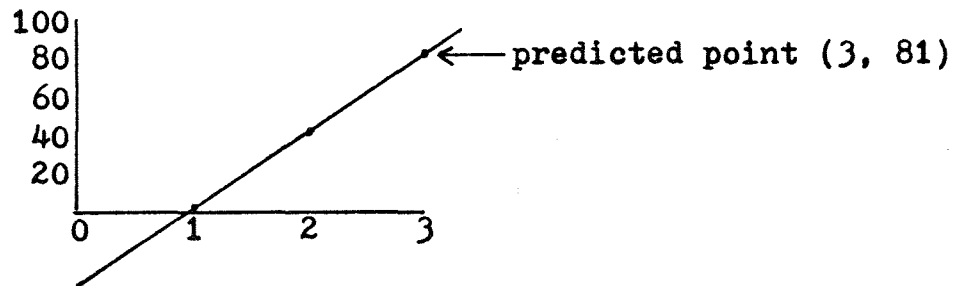
Example 10. Least Square Line.



line because it approximates or "best fits" a given set of points—a "best-fitting line." It also is called a regression line of Y on X since it tends to regress toward a mean value. Further, it is called a trend line because it presents a norm to which all future X-Y coordinates will be measured. That is, since we are interested in the dependence of Y on X, the line allows for the predicting of Y from a give value of X. For example, if $X = 3$, Y can be estimated to equal 81. In fact, this point is added below in Example 11.

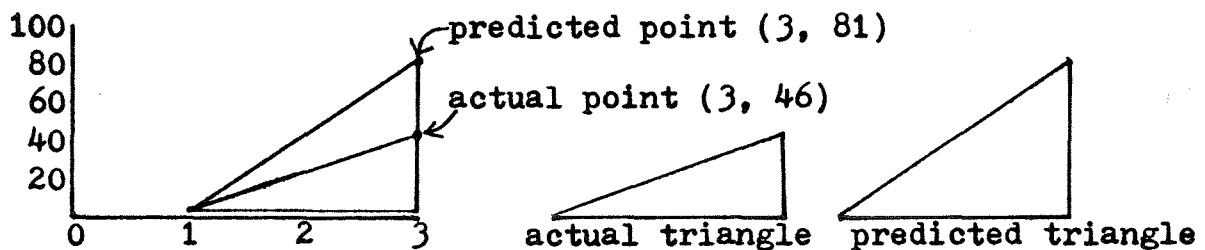
7) The plan does not stop here. It was noted previously (see Example 7) that the third actual point occurred forty-six seconds (not eighty-one) into the piece. Thus there is

Example 11. Predicted Point.



a discrepancy of thirty-five seconds between the actual point of recurrence and the predicted one. This difference is expressed in Example 12 as two right triangles, each with a different area obtained by connecting the various coordinates.

Example 12. Difference between Actual Point and Predicted Point.



8) Through careful measurement (done on graph paper but not visually rendered here), the area of each triangle is determined.

Area of predicted triangle = 12 (units)
 Area of actual triangle = 6.6 (units)

9) To obtain a difference, the area of the predicted triangle is subtracted from the area of the actual triangle. The resultant value of -5.25 is expressed as a negative,

representing a negative deviation. When the predicted point is higher than the actual point, the difference in area between triangles is negative. The converse also holds true.⁷

10) To obtain a more realistic (meaningful) value, the following equation is used to determine a deviation quotient.

$$\frac{\text{difference in area between triangles } -5.25}{\text{area of predicted triangle } 12.00} = \text{-----} = -.43$$

Dividing the difference in area between the two triangles by the area of the predicted triangle is one way of avoiding the tendency for later calculations—based on additional points—to be disproportionately greater in value since triangle areas based on coordinates which traverse greater time spans automatically will be higher numerically.

11) Each quotient derived from this process takes on meaning when re-interpreted either as a comprehensive percentage (C.%) or as a determinate percentage (D.%). The former shows the percentage of deviation displaced by a particular recurrence relative to all associations within the piece. (An analysis of Symphony No. 2 was accomplished, and the sum of deviation determined.)⁸ The latter shows the percentage of deviation relative to those associations comprised of groupings of the same identity—those accorded the same label.

12) Weighing each series of additional points cumulatively, the quotients and derived percentages for all remaining al-av associations were determined. (See Example 13.) As each quotient can be immediately evaluated with respect to quantity, a preliminary observation focuses on the disparity in value between select quotients. For example, the relatively large value, 1.74, results from the inequality in temporal distance between points (2,41) and (3,46) to that of points (3,46) and (4,192)—a difference of five seconds to 146 seconds. A huge deviation is created because of the small distance between points two and three

⁷The distinction places no value judgment on either positive and negative deviation or on positive and negative values (quotients).

⁸See my "Quantitative Measurement of Information Content via Recurring Associations in Three Movements of Symphony No. 2 by Roger Sessions" (Ph. D. dissertation, the University of Miami, 1981).

Example 13. Quotients and Derived Percentages of
Remaining al-av Associations.

		C. %	D. %
points 1-2 →	predicted point 3 = deviation: -.43	1.43	16.35
points 1-3 →	predicted point 4 = deviation: 1.74	5.80	66.16
points 1-4 →	predicted point 5 = deviation: .09	.3	3.42
points 1-5 →	predicted point 6 = deviation: -.10	.3	3.80
points 1-6 →	predicted point 7 = deviation: .27	.9	10.27

and large distance between points three and four. Statistically, this is the result of comparing the predicted fourth point, (4,74), to the actual fourth point, (4,192). Musically, affect is generated because of the delayed arrival of the fourth al-av statement. The degree of uncertainty with respect to temporal recurrence increases after seventy-four seconds into the piece, in turn creating a moment of great surprise when the fourth entrance ultimately occurs.

Two further observations focus on: 1) the presence of both positive and negative deviation, and 2) the relatively broad range in values. The three positive values, representing points which are delayed or stalled in the associative process, encompass a wide spread. For example, the fifth statement, (5,236), enters at a location close to the expected point of prediction—hence, the small quotient of .09. Yet the fourth statement, (4,192), enters at a point well beyond the predicted one—hence, the large quotient of 1.74 (more than 5% of all available deviation). The contrast is such that each point offsets the other.

The remaining two negative values, representing points which arrive sooner than expected, do not traverse an unusually wide range but do offset the top-heaviness of the three positive quotients, restoring some balance.

To conclude, the brief analysis made above shows that an underlying temporal relation is behind the derivation of each value. Conversely, each value denotes a unique musical situation defined by a distinct temporal relation of associated points.

Method I can also be applied to a single hierarchic level at a time: the amount of deviation for an association on one level can be compared to the deviation for a second association on a different level. Confirmation of the process (see

Example 14) and findings (see Example 15) verify the trend which shows greater formal symmetry with respect to proportions on the sectional level, yet greater asymmetry on the phrase level. Of course, this is hardly an earth-shaking discovery. One would expect the temporal placements on the sectional level to be fixed and structured and those at the lowest level to be more random and less ordered. With the system put forth here, however, such generalizations can be refined through the study and comparison of values derived from the statistical method.

This sort of statistical inquiry for events at diverse structural levels is especially useful. Leonard Meyer writes:

The statistical analysis of stylistic probabilities must be architectonic—different sets of probability must be discovered for different architectonic levels.

It is a mistake to suppose that probability remains relatively constant throughout musical works. Quite the contrary. Some parts of a work tend to adhere much more closely to the normative and probable than do other parts.⁹

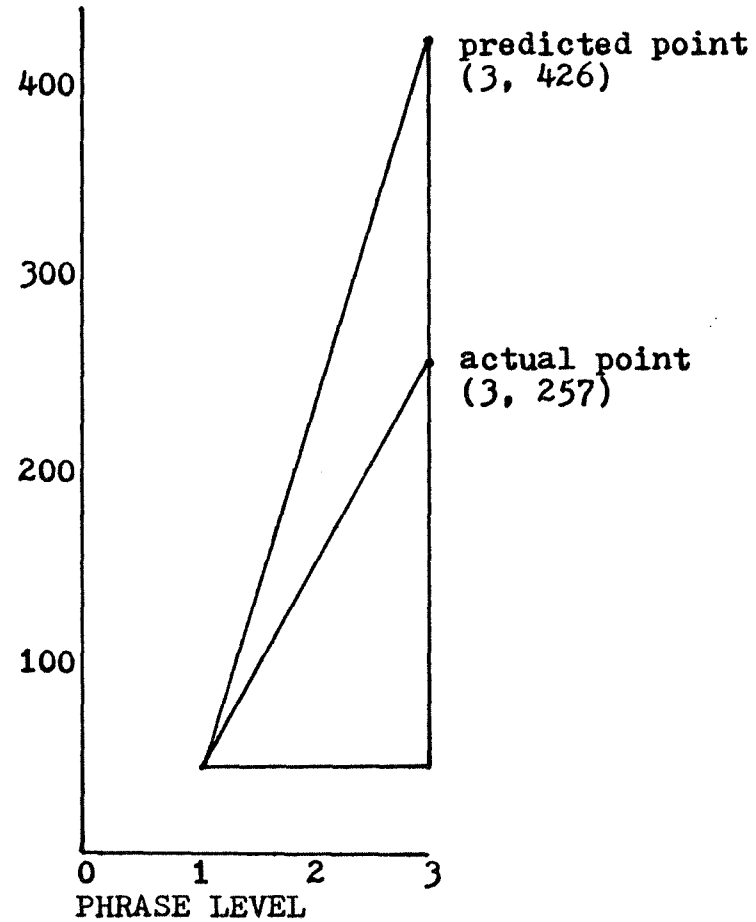
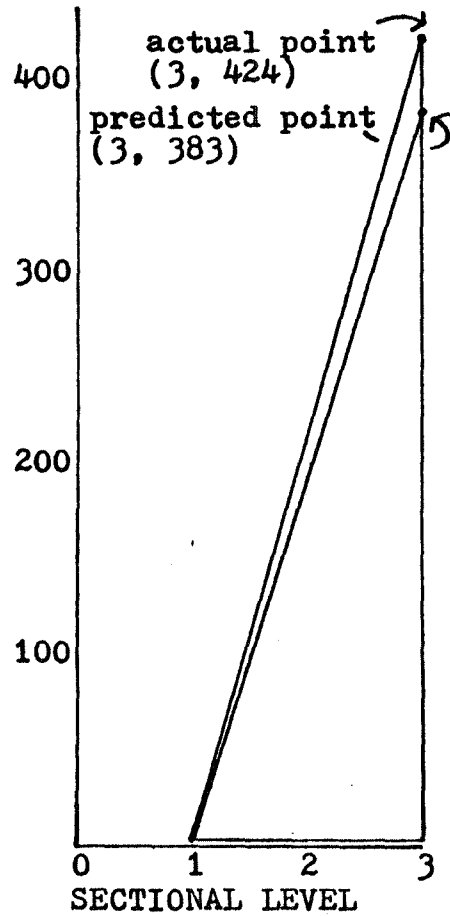
It is clear that the most successful pieces strike a balance between formal regularity of probable pattern recurrence and avoidance or negation of those same expected patterns. The plan presented above provides a means to address this inquiry.

To recap, Method I proceeds from point-to-point, summing all past event-groupings cumulatively. The prediction of each new grouping is based on a new least square line which is drawn up after the addition of new data; this results in a new value for the total summation of all past points.

Each derived value is a function of the probability of when the expectant grouping recurs. The deviation is either that of a temporal delay (the real point is experienced beforehand, arriving sooner than expected—negative deviation). In either case, the deviation occurs when the predicted groupings does not recur at the expected moment.

⁹Leonard B. Meyer, "Meaning in Music and Information Theory," The Journal of Aesthetics and Art Criticism, xv, No. 4 (1957), p. 422.

Example 14. Sectional and Phrase Comparison.



units) is compared to a second value representative of the area of the regression triangle (shown with a darkened border and falling below the abscissa). As in Method I, comparison of the two derived areas takes the form of an equation.

total summation of areas (actual deviation)	44.08	
	=	----- = .17
total area of regression triangle	248.18	

The final value of .17 is the deviation quotient; it converts into a comprehensive percentage of 4.15%. These figures assume considerable meaning if compared to similarly obtained values.¹¹

In exploring the affective structure of the least square line, (see Example 17) several observations are made. First, affect is generated above and below the line: four points—(1,1), (2,41), (4,192), and (7,424)—lie above; three points—(3,46), (5,236), and (6,257)—lie below. Significantly, this distribution of points bears upon their hierarchic status. Phrase points (3,46) and (6,257) displace the most negative deviation and contribute to most of the affect generated above the line. In contrast, the three sectional (and one subsectional) points generate the amount above the line. A pattern is obvious: all sectional points are positive, all phrase points are negative. Too, the internal arrangement of points is such that the final point, (7,424), beautifully restores formal balance; it is as though Sessions realized the need for a delayed point of recurrence—to offset the prematurely experienced phrase points.

Through the interaction of associated points, a growth pattern of progressively more deviation obtains toward the

the sum of the squares of the difference between corresponding Y values—the vertical distance from each data point to the least square line. Both methods thus represent a graphic (geometric) interpretation of least squares measurement. This approach was done for two reasons: 1) to magnify the obtained relations between deviation values in order to facilitate the quantification of affect, and 2) to allow for immediate apprehension of where the line is most affective along any of its points.

¹¹Weighed against the total amount of generated affect for remaining groupings within the entire piece, the percentage is slightly below the mean; little more than 4% affect is generated. This is interpreted here as a direct result of the tight formal control imposed by the three aligned sectional statements.

Example 15. Sectional and Phrase Comparison.

SECTIONAL:	C.%	D.%
points 1-2 → predicted point 3 = deviation:	.10	.74 18.52
PHRASE:		
points 1-2 → predicted point 3 = deviation:	-.44	3.26 81.48

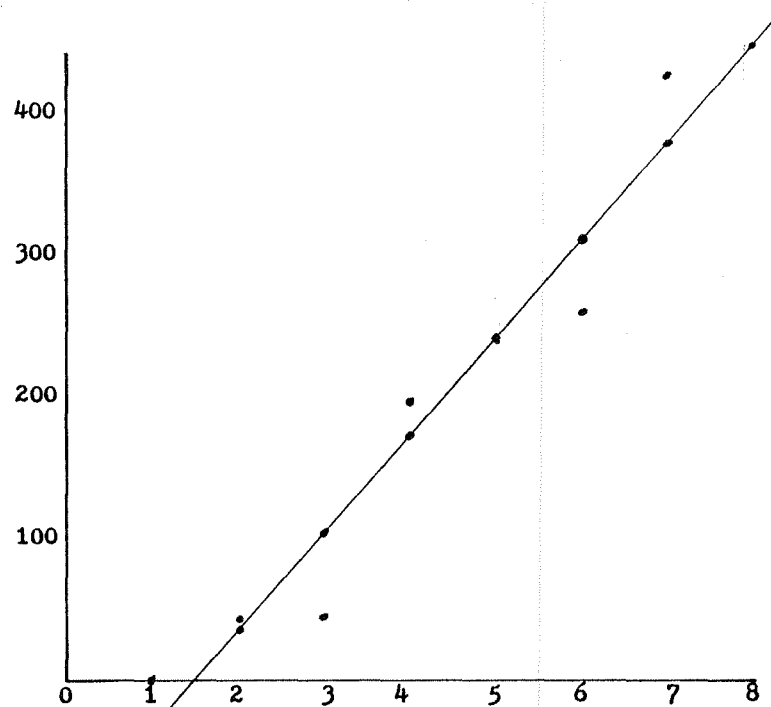
METHOD II

Method II also employs similar graphing techniques, but the foundation for evaluation is unlike that of Method I. Whereas Method I weighs all points cumulatively up to the grouping in question, Method II weighs all points cumulatively as a whole. (See Example 16.) As shown, all seven points plotted and taken collectively determine one unique least square line. It is used as the sole norm (trend) to which each statement is measured. By connecting the seven points which situate above and below the line, geometric areas (measured as triangles and rectangles) are obtained, representing an amount of deviation. (See Example 17.) Since each grouping does not occur at the expected (derived) point, a measure of affect obtains by measuring each point's area of deviation away (above or below) from the line. In such a way is the amount of deviation determined for each.

This procedure was followed. The total area—that which lies above and below the line—represents the total sum of deviation displaced by the seven points. The overall amount of affect—a total summation of the individual areas—is visually rendered.¹⁰ (See Example 17.) This value (44.08

¹⁰For a given event (value of X), the vertical difference (deviation) between the actual point (value of Y) and the predicted point (second value of Y) is obtained. This deviation is represented either by analogously derived right triangles (Method I) or by derived geometric areas (Method II). However accurate each procedure is, neither is standard nor commonly in use. Rather, as originally developed by Gauss, the usual procedure is simply to measure

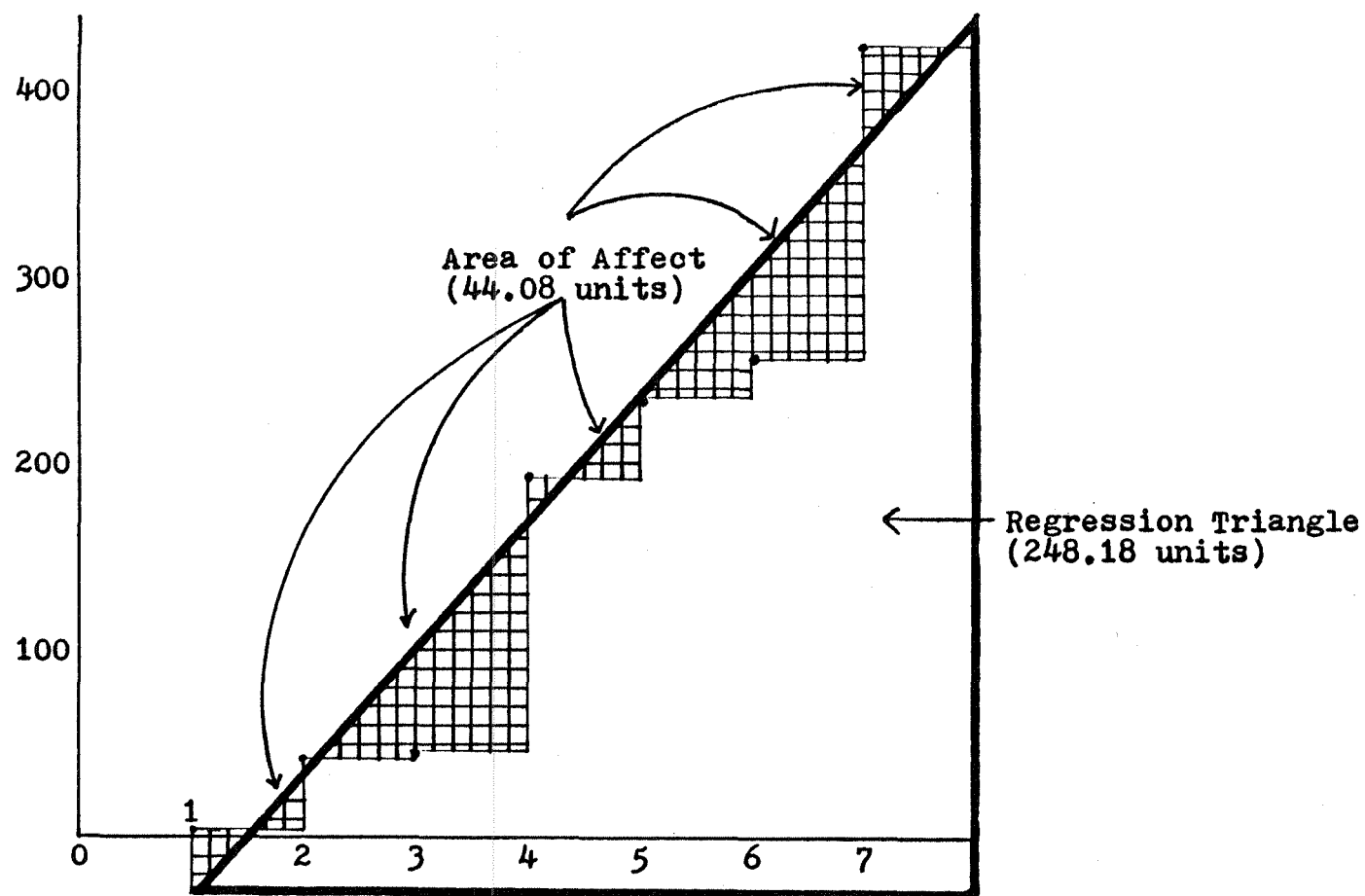
Example 16. Least Square Line as Determined by Method II.



ACTUAL POINTS: (1, 1), (2, 41), (3, 46), (4, 192), (5, 236), (6, 257), (7, 424)

PREDICTED POINTS: (1, -31), (2, 38), (3, 103), (4, 170), (5, 238), (6, 306),
(7, 373), (8, 441)

Example 17. Deviation as Determined by Method II.



end of the movement. This pattern accelerates after the second phrase occurrence, (5,236), and is strongest at the point of occurrence for the third phrase statement, (6,257). Significantly, the latter point lies within the development at a centrally located position within section A', at approximately the innermost point! (The entire movement lasts for 498 seconds.)

Curiously, the least affective point also occurs on the phrase level at (5,236). It invites comparison with the point of greatest affect, (6,257). Neither point is emphasized nor set off from the other through further contrast, and both are couched in similar contexts. Yet one is least affective, the other is most affective within the confines of the development; there is no pattern of consistency with respect to which points are emphasized. The amount of affect generated by one offsets the amount generated by the other. This contrast is created without further verification through compositional means.

The point of most affect, however, is emphasized musically. The line is most affective at (3,46), the initial phrase grouping. Although there is least change at the phrase level, the sudden recurrence in m. 24 is emphasized in several ways. Theme al continues almost unbroken from the statement in m. 22. Still, the phrase association is consummated via isolated announcements of av in the piano and strings: the chord is articulated only once, accented double forte, and stated in isolation from surrounding instruments of similar timbre. A single cymbal stroke (not shown), also marked double forte and set off from attendant timbral sonorities, furthers the necessary contrast and phrase demarcation. It is as though Sessions desired to draw special attention to this initial phrase entry in preparing for the forthcoming less obvious statements in mm. 99 and 112.

This brief analysis is by no means complete. Still, however tentative it may be, it illustrates the sort of inquiry and path of investigation that one would follow and it points to the kind of disclosures that would be obtained from the method's enactment.

PART IV

To establish proof that deviations from the expected are affectively meaningful, I first suggest that the two approaches to measurement bear a kinship to two ways of listening. Method I is analogous to how we perceive a piece for the first time—as a dynamic process, moving point-by-point, not knowing what lies ahead. It is akin to how we hear music as it is occurring.

In contrast, Method II is analogous to hearing a piece after several listenings—as a static process. The expectations do not move or change. Rather, they are fixed: we know beforehand which were fulfilled and which were not. Meaning is grasped after the listening experience is completed, and our expectation of forthcoming events is based on a previous assimilation—on the totality of impressions received from past listenings. It is akin to how we hear music after it has occurred.

Edward Cone's view of musical perception supports this twofold distinction. Through what he terms the "mode of synoptic comprehension," a work's unity and controlling form can be grasped ex post facto—through an awareness of what has occurred, the sum of what the listener has perceived. On the other hand, through the "mode of immediate apprehension," a work's most basic constituents can be observed moment-by-moment, without the benefit of hearing a work in its completeness.

The latter mode (immediate apprehension) is most like Method I. We are grasping or apprehending adjacent interrelations (though in a cumulative manner). The former mode (synoptic comprehension) is most like Method II. A work is understood as a whole, and relations are deduced after the listening experience has ended. Significantly, Cone states: "The ideal hearing of a composition is one that enjoys both modes simultaneously."¹² Similarly, the plan of measurement submitted here proceeds through two steps.

Leonard Meyer provides further evidence. In a discussion on meaning, he suggests that three states exist: hypothetical, evident, and determinate. In particular, the latter two types are comparable to the type of affective experiences felt through the employment of Method I and Method II, respectively. Referring to our tendency towards expectation as that engendered by the antecedent-consequent situation, Meyer discusses evident meaning:

Evident meanings are those which are attributed to the antecedent gesture when the consequent becomes a psychophysical fact and when the relationship between the antecedent and consequent is perceived. Since the consequent of a stimulus itself becomes a stimulus with consequents evident meaning also includes the latter stages of musical development.¹³ (My emphasis)

¹²Edward Cone, Musical Form and Edward Cone, Musical Performance (New York: W.W. Norton and Co., 1968), pp. 96-97.

Since "this relationship changes as the music unfolds,"¹⁴ the analogy to Method I is clear: it is the temporal relationship between an association's changing two points which determines the extent of evident meaning (affect)—a meaning generated solely by the point's position in time.

A second analogy, that to Method II, exists. On determinate meaning, Meyer writes:

Determinate meaning arises only after the experience of the work as timeless in memory, only when all the meanings which the stimulus has had in the particular experience are realized and their relationships to one another comprehended as fully as possible.¹⁵

It is only after all temporal relationships between associations have been noted, and the listening experience completed, that the extent of affect for each grouping can be ascertained.

One final note: in that I have chosen the word "affect" (over a term such as "information," etc.), and have asserted that associations not only are salient factual properties but are experientially affective to the listener, the importance of perception simply has been acknowledged. George Rochberg writes:

To maintain that there is no meaningful relation between structure and its perception, that it makes no difference what the nature of structure is and, further, that its perception is no longer a matter of import, is to deny the validity as well as the possibility of music as an art.¹⁶

In short, our conception of a work's structure relates to our perception of musical affect.

¹³Meyer, Emotion and Meaning in Music (Chicago: The University of Chicago Press, 1956), p. 37.

¹⁴Meyer, Music, the Arts, and Ideas (Chicago: The University of Chicago Press, 1967), p. 12. Barney Childs, for one, furnishes additional support: "We will most probably attempt to order the increasing totality of what we have heard and are hearing as it happens." See "Time and Music: A Composers's View," Perspectives of New Music, Vol. 15, No. 2 (Spring-Summer, 1977), p. 202.

¹⁵Meyer, Emotion and Meaning in Music, p. 38.

¹⁶George Rochberg, "The New Image of Music," Perspectives of New Music, vol. 2, No. 1 (Fall-Winter):6.

To further buttress the argument that recurring associations are affective content, three brief points are introduced as supportive evidence. The first focuses on the issue of recurrence: that a recurrence is not only formally significant, acquiring an objective function, but also of affective consequence, has been documented by many aestheticians.¹⁷ Hence, I quote an eminent composer:

Recall or return in music establishes the necessary condition for the meaning of the music experienced as formal order in and through duration. What the composer repeats or recalls must necessarily have meaning. The listener corroborates this by the degree to which he is able to recreate the form of the music.¹⁸

(It is not necessary nor do I wish to distinguish between "meaning" and "affect;" suffice it to say that the term "affect" means an emotional or felt experience in response to a musical stimulus.) Acknowledging that affect is associated with fulfilled and unfulfilled tendencies, it is the felt or unfelt stimulus of some recurring event which generates the affect. We respond to each new recurrence because of the felt anticipation of its arrival. As Meyer puts it: "Because there is departure and return, recurrence always involves a delay of expectation and subsequent fulfillment."¹⁹

Second, through our perception of the placement of such recurrences, we automatically note the interval of duration which separates any two groupings. Not surprisingly, duration also bears a kinship to affect:

A study of the various circumstances in which feelings of time may be manifested shows that

¹⁷For example, see Wilson Coker's Music and Meaning: A Theoretical Introduction to Musical Aesthetics (New York: The Free Press, 1972), in particular, pp. 76-77. Insofar as it is through the principle of return that a work's comprehensive meaning can be obtained, each individual event-recurrence contributes to the extent of that work's meaning.

¹⁸George Rochberg, "Duration in Music," in The Modern Composer and His World: A Report From the International Conference of Composers, held at the Stratford Festival, Stratford, Ontario, Canada, August 1960, ed. by John Beckwith and Udo Kasemets (Toronto: The University of Toronto Press, 1961), p. 59.

¹⁹Meyer, Emotion and Meaning in Music, p.152.

the latter have their origin in the consciousness of frustration caused by time. Time either imposes a delay on the satisfaction of our present desires or it obliges us to foresee the end of our present happiness. The feeling of duration thus arises from a comparison of what is with what will be, i.e., from awareness of the interval separating the two events.²⁰
(My emphasis)

The duration which obtains between two occurrences is subsequently felt as a delay of expectation:

The case in which our consciousness of duration is most manifest is that of expectation. There is expectation when circumstances impose a delay between the first awareness of a need and its fulfillment.²¹

In brief, the perception of recurrence and consciousness of duration are interrelated and each, in its own way, provides a corollary to experienced affect.

Finally, the generation of some affective response also is closely tied to our preconceptions about a music's style. Meyer writes:

The customary or expected progression of sounds can be considered as a norm, which from a stylistic point of view it is; and alteration in the expected progressions can be regarded as emotional or affective stimuli.²²

In Sessions's Symphony No. 2, associations are stylistic properties: for example, at the sectional level, formal balance is achieved through the demarcation of structural boundaries by strategically placed groupings. Hence, the temporal placement of such groupings is a stylistic factor, projecting a norm which provides the criterion for the listener's response.

²⁰Paul Fraisse, The Psychology of Time trans. by Jennifer Leith (New York: Harper and Row, Publishers, 1963), pp. 209-210.

²¹Fraisse, Psychology of Time, p. 202.

²²Meyer, Emotion and Meaning in Music, p. 32.

Summarizing what has been said, three main points stand out:

- 1) Recurring associations are the source from which affective responses are elicited from the listener.
- 2) The criterion by which we experience affect is the temporal placement—the position in time— of each compound within the music's continuum.
- 3) The cause of the affectual response or elicitation from the listener underlies the psychology of affection and how we listen: an association's temporal position is experienced either beforehand or after the expected moment in time in which the recurrence is to take place (the latter of which is determined statistically).

In conclusion, this study has put forth the theory that the temporal placement of event-groupings is affectively meaningful to the listener. It is new in that it is based on the premise that events generate points of affect through the amount of variation accorded them, but that the amount of affect results solely from their explicit point in time. Insofar that the study has laid a foundation for further analytic inquiry, works beyond Sessions may yield fruitful results under the aegis of this new theory.