CONFRONTING STRAVINSKY:

Man, Musician, and Modernist

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10 Discontinuity and Proportion in the Music of Stravinsky

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CRITICS AND ANALYSTS of Igor Stravinsky's music have often noted his predilection for harmonic stasis. Particularly in music written during the 1910s, he created extended passages based on single chords or on the alternation of two chords. One plausible reason for this stylistic trait is that he wanted to focus the listener's attention on rhythm. Whatever the motivation, there are important consequences of his use of frozen harmonies. When a section uses an unchanging harmonic area, the move into the subsequent section necessarily entails discontinuity. There is an inevitable break in the harmonic continuum, and the result is overtly sectionalized music.[1] Although the delineation of sharply juxtaposed sections has its origin in harmonic stasis, the resulting discontinuity is generally supported by other means—contrast of instrumentation, texture, motivic material, tempo, formal design, and even compositional procedure. Not all of Stravinsky's music is discontinuous, of course, just as not all of his harmonies are static, but discontinuity is crucial to his style.

His harmonically static sections unfold more through permutation and variation than through progression and development. The lengths of such sections are thus less internally predictable than are traditional tonal durations. Stravinsky often ends a section at what seems to be the exact right point, despite the impossibility of our forecasting this arrival. The unpredictability comes from the lack of goal-directed development within sections; the sense of rightness comes from the context of the whole piece.

Harmonic stasis implies a relatively small number of structural levels. When the foreground not merely prolongs but actually sustains middleground harmonies, the number of distinct levels between the details and the deep structure cannot be many. Thus, sections of different lengths can function on the same hierarchical level. That a section of a few seconds' duration can be the structural equivalent of one over a minute long makes Stravinsky's music utterly unlike tonal

This article is dedicated to the memory of Norman Dinerstein, with whom I had several fruitful discussions on Stravinsky's music while preparing the original draft.

1. Discontinuity in Stravinsky's music is also discussed in Pasler's article in this collection, in which she analyzes the juxtapositions of sections in the early ballets.

compositions, in which shorter passages are usually subsidiary to longer sections.

Stravinsky's originality has influenced subsequent generations. The Darmstadt composers, for example (Stockhausen, Nono, Zimmermann and others), made his concept into both an aesthetic manifesto and a compositional technique, as shown by Stockhausen's formulation of "moment form." Moments are self-contained sections created by internal stasis or by processes that complete themselves within the moments.[2] A moment-form composition does not have an underlying progressive logic propelling it from beginning to end; rather, it is a mosaic of *seemingly* independent sections assembled in *apparently* arbitrary order. Because one moment does not progress to another, the form does not unfold linearly. Instead, an immobile whole is unveiled gradually. As we hear more of a performance, we acquire more information that allows us to apprehend the formal balance. It almost (and in some cases literally) does not matter in what order moments are heard, as long as we come to understand their proportional interrelationships. Stravinsky never composed a true moment form; there is always some degree of linearity, however disguised, and stasis is never absolute. Hearing his discontinuous compositions as mosaics is nonetheless appropriate. Just as a moment form's purposeful impoverishment of structural levels forces us to hear all moments as having equal importance regardless of their lengths, so in Stravinsky's sectionalized music, formal coherence comes from balance between relatively static sections that are heard as equivalent, no matter what their durations.

Stravinsky's music is, as I have indicated, unlike tonal music. When we speak of balance between sections in tonal music, we have trouble offering convincing evidence to support our intuitions. The experience of musical time, after all, is not much like the experience of clock time. Changes in harmonic rhythm, in the rate of information flow, in densities, and in degrees of predictability create a malleable temporality that is the essence of tonality's linearity. The pacing by which tonal music reaches its (predictable) goals is what that music is all about. Thus, the relative durations of two sections *as experienced* may not have much to do with their "actual" lengths as measured by the clock. The kineticism of tonality distorts (though not unpleasantly) our perception of time. We therefore cannot learn much about the experience of tonal form by counting beats, bar lines, or seconds.[3]

In Stravinsky's music, however, the problem is much simpler. Sections that are self-contained and static within their contexts do not appreciably distort our sense of time. We can compare the measurable lengths of sections. The stasis and consistency of the moments, along with the high degree of discontinuity that sep-

2. Jonathan D. Kramer, "Moment Form in Twentieth Century Music," *Musical Quarterly* 64 (April 1978): 177–94.

3. Some quantitative analyses have shown interesting equivalences in tonal music, but I question how *perceptually* relevant such observations really are.

arates them, makes experiential time correspond much more closely to clock time than in tonal music. Thus, we can investigate proportional lengths of sections objectively with some confidence that what we are talking about is perceived.

The first step in studying proportions is to decide which sections to compare. The concept of a moment is a useful starting point. Assuming that a moment is a clearly defined, self-contained section, we can readily decide where the moment divisions are. Although the designation of moment boundaries is initially an intuitive decision, we can always discover a given composition's rationale for moment definition. In *Symphonies of Wind Instruments* (1920; revised 1947), for example, moments are delineated by discontinuity in three "parameters": harmony, motivic material, and tempo.

With the moments defined, we can look for meaningful subdivisions and groupings of moments. We can demarcate submoments, again using *Symphonies* as the example, by noticing change in two of the three parameters. In other compositions, different factors may create moments, submoments, and moment groups. But in every case, we are dealing with about three distinct yet adjacent structural levels.

Once the section boundaries on each level have been located, the third step is to calculate the durations of the sections using Stravinsky's metronome markings (fermatas must be estimated). Then we can compare the lengths of sections in order to uncover possibly consistent relationships between durations of adjacent sections and of sections with similar material and between durations of section subdivisions.

By subjecting a number of Stravinsky's works to such analyses, I have made some interesting discoveries. He seems initially to have been attracted to discontinuities primarily for their expressive impact (and because they correspond to individual dances of the ballet). *The Rite of Spring*, for example, appears to display no overall pattern of temporal proportions. The aesthetic of discontinuity emerges in the early ballets, but the creation of formal balance by overall proportional consistencies is a later development, perhaps a consequence of Stravinsky's increasingly classical aesthetic.

After experimenting with overt discontinuities in the second and third of the Three Pieces for String Quartet (1914), the composer began to organize his forms temporally. Because that work is a miniature, the lengths of moments vary in accordance with typical additive rhythmic procedures—each time certain figures return, they are a beat or two longer or shorter. But we do feel in this piece an embryonic sense of balance between unequals. More sophisticated is the first tableau of *Les Noces* (1914–1917, but revised through 1923), where sections vary in length from 6 to 35 seconds. Stravinsky convinces us to hear these moments as of equivalent weight by giving several independent, nonadjacent sections the same duration (see Table 10.2). Not all the moments, however, participate in equality relationships.

The real breakthrough piece is *Symphonies*. Here the composer moves beyond

additive durations and identity relationships to discover a principle that he was to develop and refine during the remainder of his life: the use of a single multiplicative ratio to determine most of the moment durations of an entire (or at least a major portion of a) piece. The ratio in this case is 3:2, probably the most readily perceived relationship beyond identity (1:1) and doubling (2:1). However, the actual ratio is less important than the consistency with which it is used. Every moment in the first half of the piece (and most of the submoments as well) is in a 3:2 relationship of duration with another moment, and all these relationships are perceptible because they are between adjacent or similar moments. The economy and consistency of a system that determines proportional lengths from the smallest (7 seconds) up to the largest (80 seconds) moments have a lot to do with why the work seems carefully balanced despite frequent discontinuities and extremely disparate section durations.

The neoclassical music is often less overtly discontinuous than the earlier works, and it is not always blatantly static within sections. Nonetheless, the pieces are often sectionalized, and the sectional lengths are usually determined by consistent proportions. For example, the Sonata for Two Pianos (1943–1944), especially in its first movement, is concerned with ratios slightly greater than 1:1 (see Table 10.4). To generate proportions from a ratio such as 1.1:1.0 is to create a compromise between additive and multiplicative procedures.

The most pervasive and elegant proportioning I have found in Stravinsky's music is in *Agon* (1953–1957). This highly discontinuous work has puzzled commentators by its disparity of materials yet unmistakable unity. Part of the reason is the incredible sense of balance Stravinsky creates by utilizing one ratio to determine virtually all the important durations, from the level of the submoment (as brief as 14 seconds) to the entire 18-minute composition. The sections in *Agon* are delineated by a great variety of means, including but not limited to harmonic stasis, and even the compositional methods (serial versus neotonal) vary. Yet *Agon* magically coheres. The pervasiveness of one proportional ratio offers the single-mindedness absent from the work's surface.

Stravinsky's proportional consistencies are never exact, which implies that he did not consciously calculate sectional durations (the first movement of Three Pieces is probably an exception—see Table 10.1). We should not be surprised that a composer as sensitive to surface rhythms as Stravinsky should also have a finely developed intuitive sense of temporal middleground. His intuition operated within the limits of perception. Thus, a section lasting 20 seconds can be heard as equivalent to one 20-1/2 seconds long, in the appropriate context. We do not know what degree of deviation is so slight that it cannot be perceived, but it is surely significant that Stravinsky's choice of tempos as a performer often only approximated his metronome indications.[4]

4. I am indebted for this observation to Jeremy Noble.

Stravinsky's sense of timing became more acute as he matured, so deviations from exactness are smaller in later than in earlier works. This refinement allowed him to work with more complex ratios. In *Symphonies,* for example, most deviations from 3:2 are within a range of 7 percent; in other words, proportions in the range from 1.40 to 1.61 function as approximations of 1.50 (=3:2). Thus, a 30-second section (in 3:2 relationship to a 20-second section) can be approximated by durations lying between 28.0 and 32.2 seconds. This range of approximation is acceptable *in context* because other simple ratios do not fall within the range 1.40 to 1.61—4:3 = 1.33, 5:3 = 1.67, 5:4 = 1.25, the golden mean = 1.62, and so on.

In *Agon,* Stravinsky uses a more sophisticated ratio—1.19:1. No longer is a 7 percent deviation acceptable because it would allow ratios ranging from 1.11 to 1.27. In such a context, durations ranging, for example, from 18.7 seconds to 21.4 seconds cannot approximate 20.0 seconds because durations in the proportion 1.19:1 to 20 seconds are 16.8 and 23.8 seconds; 21.4 (7 percent approximation of 20.0) is not so far from 23.8 after all. Almost all the approximations in *Agon* are within 2.7 percent of accuracy; thus, 20.0 seconds is approximated by durations between 19.5 and 20.5 seconds, which are considerably closer to 20.0 than to, respectively, 16.8 and 23.8. Such close approximations are surely well within the limits of perception. That *Agon* utilizes its proportional ratio as consistently and on as many structural levels and that it does so to such a high degree of accuracy is remarkable. Stravinsky's sensitivity to formal proportions is truly impressive.

Three Pieces for String Quartet is a frankly experimental work.[5] The first movement, which is thoroughly static harmonically and repetitious melodically, is a deliberate exploration of proportional control, although it differs from Stravinsky's subsequent procedures. The third and especially the second movements are experiments in extreme discontinuity. The composer's later methods seem to develop from the implications of both the quantitative durations in the first and the discontinuities in the other movements. The lengths of sections in the later movements result from additive rhythms, and the durations in the first movement are *simultaneous* time spans of unequal duration.

Table 10.1 explains the unique approach to duration in the opening movement. There are three continually repeating cycles (actually four, but the violacello 7-beat cycle coincides with and thus supports the second violin 21-beat cycle). The 23-beat melodic pattern in the first violin and the second violin's 21-beat duration are completely regular while the other second violin span varies irregularly within narrow limits. The number of beats between the relaunching of different spans varies because the spans are of unequal length. The relationship is

5. Forte, in his article in this collection, singles out this work for its important advances in Stravinsky's pitch language.

Table 10.1. Three Pieces for String Quartet, First Movement—An Experiment in Harmonic Stasis and Additive Durations

A	15				22				19				21				22				13	
AB	7		8		15		7		16		3		20		1		22				13	
B	7		23				23				23				23				13			
BC	4	3		18		5		16		7		14		9		12		11		10		3
C	4		21				21				21				21				21			3
AC	4		11		10		12		9		10		11		10		11		11		10	3
A	15				22				19				21				22				13	

There are three main ideas of differing lengths that cycle continually throughout the movement. "A" is the duration initiated by 4 (but *not* 8) eighth-notes in the second violin; the average length of this slightly varying cycle is 21 beats. "B" is the first violin's melodic line, which repeats literally after 23 beats. "C" is the duration initiated by 8 (not 4) eighth-notes in the second violin; the length of each of these cycles is 21 beats, supported throughout by the 7-beat cycles in the viola and cello. The chart shows the cycles and their mutual interaction throughout the 112-beat movement.

"AB" shows where within the B cycle each A cycle starts (and conversely, where within the A cycle each B cycle begins); in other words, "AB" shows how many beats, after each melodic relaunching in the first violin, the second violin plays 4 eighth-notes: 8, 7, 3, 1, and 0 beats, respectively. "BC" shows where within the B cycle each C cycle commences; in other words, "BC" indicates that, respectively, 18, 16, 14, 12, and (theoretically) 10 beats after the first violin begins its melodic statement, the second violin plays 8 eighth-notes. Conversely, after the second violin starts its 8-eighth-note figure, the first violin begins its next melodic cycle, respectively 3 (theoretically), 5, 7, 9, and 11 beats. "AC" shows where within each A cycle a new C cycle begins (and conversely). In other words, the duration from the start of one 8-eighth-note figure in the second violin to the start of the next is approximately evenly subdivided by the start of a 4-eighth-note figure, also in the second violin. The slight exception occurs in the second C cycle, which is subdivided 12 + 9 rather than the more nearly even 11 + 10 or 10 + 11. It is difficult to explain this anomaly in an otherwise quite regular scheme other than by suggesting a slight (and typical) degree of unpredictability. Or was this exception an oversight during the compositional process?

The basic additive duration is 2 beats, which derives from the difference in length between the two regular cycles—B (23 beats) and C (21 beats). This duration accounts for the gradual lengthening in the time between the start of an 8-eighth-note cycle and the start of the subsequent melodic cycle.

The cycles are potentially infinitely repeatable. The movement starts so that it avoids the overlapping of the end of an 8-eighth-note figure and the start of a melodic cycle (shown theoretically in the chart). The movement ends after the 4-eighth-note and the melodic cycles ("A" and "B") have begun together.

Table 10.2. ***Les Noces*. First Tableau**—Moment and Submoment Durations and Proportions

Section	Rehearsal Numbers	Duration in Seconds
whole tableau	**0** to **27**	293.3
	moments	
A0 + B1 + C2	**0** to **4**	69.5
A4 + B5 + C7	**4** to **8** + 3	68.2
A8	**8** + 3 to **9**	10.5
D9 + E10 + F11 + G12 + D14 + H16 + D18	**9** to **21**	82.9
A21 + C24	**21** to **27**	62.2
	submoments	
A0	**0** to **1**	20.2
B1	**1** to **2**	28.1
C2	**2** to **4**	21.2
A4	**4** to **5**	27.8
B5	**5** to **7**	27.4
C7	**7** to **8** + 3	13.0
D9	**9** to **10**	6.0
E10	**10** to **11** +	7.0
F11	**11** + to **12**	10.0
G12	**12** to **14**	14.2
D14	**14** to **16**	13.0
H16	**16** to **18**	12.2
D18	**18** to **21**	20.5
A21	**21** to **24**	35.2
C24	**24** to **27**	27.0

Submoment durations have a tendency to cluster around certain values (6.5, 10.2, 12.8, 20.6, 27.4), but consistent proportional ratios are not in evidence. This clustering indicates a concern with approximate equality of durations for different sections:

D9 = 6.0 F11 = 10.0 H16 = 12.2 A0 = 20.2 C24 = 27.0
E10 = 7.0 A8 = 10.5 C7 = 13.0 D18 = 20.5 B5 = 27.4
D14 = 13.0 C2 = 21.2 A4 = 27.8
D9 + E10 = 13.0

A0 + B1 + C2 = 69.5
A4 + B5 + C7 = 68.2

A0 + B1 + C2 + A4 + B5 + C7 + A8 = 148.2

D9 + E10 + F11 + G12 + D14 + H16 + D18 + A21 + C24 = 145.1

additive because this number of beats increases or decreases by 2 each cycle. Details are shown in Table 10.1.

Perhaps this experiment taught Stravinsky that carefully controlled durations can have a perceivable effect and that they can generate a form. The use of simultaneous cycles of different lengths must have proved too constricting, however, and he never again used such a procedure. Rather, he began to control durations of separate sections, such as those created by the discontinuities in the last two movements.

In *Les Noces*, one of the first works to control section durations, Stravinsky does not yet relate different lengths by means of consistent ratios, but his concern with overall formal balance is evidenced by a tendency to make disparate moments (that is, those that are neither adjacent nor motivically similar) equal in length. As Table 10.2 shows, the first tableau has eight motivically distinguishable submoments: A, B, C, D, E, F, G, and H. These submoments are grouped into five movements: ABC, ABC, A, DEFGDHD, and AC. As Table 10.2 indicates, several distinct submoments share lengths. These equalities unify a movement that contains 16 sections ranging from 6.0 to 35.2 seconds. Discontinuity is maximized by keeping transitions small; thus, the equal lengths of passages placed in different parts of the tableau definitely contribute to the form. Moments as well as submoments are balanced by durational equality: the first two ABC moments (respectively from the beginning to rehearsal number **4** and from **4** to three measures after **8**) are of equal duration. The largest internal discontinuity (at **9**, where a new tempo and new motivic materials are introduced) divides the tableau into two virtually equal durations.

These equalities lend a subliminal sense of balance to this collection of harmonically static sections. There is, of course, an underlying progression, and return of materials from earlier submoments does round out the form. Nonetheless, the equality of (sub)moment durations is more important to the form than their order of succession, and thus the structure is more nonlinear than linear.

Equalities of durations proved to be a viable but restricted solution to the problem of static form. In *Symphonies of Wind Instruments*, Stravinsky relates section lengths not by identity but by the ratio 3:2, which allows him to project a sense of relatedness between different durations. To make such balances perceivable, he applies the proportional ratio to sections whose relatedness is already suggested by adjacency or similarity.

As in *Les Noces*, transitions are short so that discontinuity is maintained. The sectionalization created by harmony, motivic material, and tempo is supported by changes in instrumentation and texture. Table 10.3 shows several manifestations of 3:2 proportions in the first half of the piece. Included are the submoments of the first long moment, a chain of moment durations from large to small involving all the D moments and all but the final A moment, relationships between the D moments and their submoments, the last three moments, and the remaining two moments. Table 10.3 also shows several larger scale meaningful

Table 10.3. ***Symphonies of Wind Instruments.*** **Portion up to 42—** Durations and Proportions

Section	Rehearsal Numbers	Duration in Seconds	Tempo	Defining Characteristics
			moments	
A0	**0** to **6**	49.6	Tempo I	F and B♭ in bass
B6	**6** to **8**	12.2	Tempo II	modal flute tune with static harmony
C8	**8** to **9**	7.8	Tempo II	3-note bassoon melody with static harmony
A9	**9** to **11**	14.2	Tempo I	clarinet and trumpet fanfare
D11	**11** to **26**	80.0	Tempo II	consistent high register B
A26	**26** to **29**	22.5	Tempo I	clarinet and trumpet fanfare
D29	**29** to **37**	35.3	Tempo II	flute and clarinet duet with punctuations
A37	**37** to **38**	9.6	Tempo I	clarinet and trumpet fanfare
C38	**38** to **39**	7.5	Tempo II	3-note bassoon melody with static harmony
A39	**39** to **40**	10.8	Tempo I	clarinet and trumpet fanfare
B40	**40** to **42**	16.1	Tempo II	modal tune with new continuation
			submoments	
a0	**0** to **1**	7.9	Tempo I	clarinet and trumpet fanfare
a1	**1** to **2**	12.9	Tempo I	block chords
a2	**2** to **3**	5.2	Tempo I	clarinet and trumpet fanfare
a3	**3** to **4**	3.6	Tempo I	foreshadowing of **44, 46,** and **58** in oboes
a4	**4** to **6**	20.0	Tempo I	block chords
d11	**11** to **15**	26.1	Tempo II	ascending motive
d15	**15** to **26**	53.9	Tempo II	flute and clarinet duet with punctuations
b40	**40** to **41**	8.6	Tempo II	modal flute tune with static harmony
b41	**41** to **42**	7.5	Tempo II	cadential harmonic stasis

The melodic material, basic harmonies, moment types, and proportional system change after **42.** The new system is less economical than the one used before **42.** The fermata duration is averaged from several recordings considered authentic and/or accurate (Craft, Stravinsky, Boulez). Section durations are calculated according to Stravinsky's metronome markings (in the 1947 version), from the first attack point of a section to the first attack point of the following section.

The analytic decision of what constitutes a moment in the context of *Symphonies* is perceptual and (initially) intuitive. Justifications for such decisions can, in every case, be given: when there is a change in harmony, melodic material, and tempo, a new moment has arrived; when only two of these three "parameters" change, a new submoment has arrived. The one exception is the move from B6 to C8, which share tempo II. Because of the highly restricted nature of the melodic material and harmonies in both these moments, their contrast is sufficiently great for them to be heard as separate moments. The "defining characteristics" listed in the chart indicate some, but never all, of the factors that suggest hearing the indicated sections as moments or submoments. The transitions that appear at the ends of some moments are too brief to upset either the essential discontinuity of the form or the stasis of the harmony within each moment.

Table 10.3. *continued*

"Meaningful" proportions are those between adjacent or similar (sub)moments. The pervasive ratio of proportions is 3:2 = 1.50. Each moment and every submoment except those of B40 is in an approximate 3:2 relationship with an adjacent or similar (sub)moment. These approximations are usually, but not quite always, close. The relevant 3:2 approximations are:

submoments of A0

a4 : a1 = 1.55 (similar submoments)
a1 : a0 = 1.63 (adjacent submoments)
a0 : a2 = 1.52 (similar submoments)
a2 : a3 = 1.44 (adjacent submoments)

chain from large to small involving all A and D moments except A39

D11 : A0 = 1.61 (longest moments)
A0 : D29 = 1.41
D29 : A26 = 1.57 (adjacent moments)
A26 : A9 = 1.58 (similar moments)
A9 : A37 = 1.48 (similar moments)

submoments of D

D11 : d15 = 1.48 (subdivision of D11)
d15 : D29 = 1.53 (D29 is a condensation by omissions of d15)

last three moments

B40 : A39 = 1.49 (adjacent moments)
A39 : C38 = 1.44 (adjacent moments)

only adjacent moments with same tempo

B6 : C8 = 1.56 (adjacent moments)

3:2 approximations involving groups of adjacent moments

(B6 + C8) : A9 = 1.41
(three adjacent moments)

(A9 + D11) : (A26 + D29) = 1.63
(both D moments and their respective preceding A moments)

(A39 + B40) : (A37 + C38) = 1.57
(last four moments)

(A0 + B6 + C8) : (A37 + C38 + A39 + B40) = 1.58
(first three moments compared to last four moments)

(A0 + B6 + C8 + A9 + D11) : (A26 + D29 + A37 + C38 + A39 + B40) = 1.61
(all moments, partitioned after longest moment)

3:2 proportions involving groups of adjacent moments, including the subdivision of the whole first half of the piece according to 3:2.

Moments range in length from 7.5 to 80.0 seconds, submoments from 3.6 to 53.9 seconds. Yet, because of carefully controlled degrees of discontinuity, the moments all function on the same structural level and the submoments on the next level "down." The pervasiveness of the 3:2 proportional ratio has a lot to do with the equivalence of sections of vastly unequal durations. Not every meaningful ratio in *Symphonies* approximates 3:2, but there is sufficient consistency of proportions to unite disparate lengths. Because discontinuities are frequent and transitions are minimal, some means other than foreground continuity are needed for formal coherence. Stravinsky chose two means: stepwise background connections (to show these would require a detailed reductive analysis, which is beyond the scope of this chapter) and consistent proportions. He was thus able to compose a work of stark, almost violent, contrast, a work that nonetheless seems somehow economical, self-motivated, self-actualizing. This is an achievement of stunning imagination and originality. Stravinsky created a music in which proportions not only matter to the form but actually generate it. Tonal music traditionally concerns itself with rates of motion, but in *Symphonies*, we feel proportions of blocks—durations of stasis.

Stravinsky's neoclassical music is in some ways more subtle than his earlier music. When it is discontinuous, juxtapositions are less stark. When harmonies seem static, they are not necessarily totally unchanging. Often the harmonies are not static at all. After a decade of deep involvement with frozen chords, the composer embraced the music most deeply involved with motion. He was able to strip tonal sounds of their kinetic implications and to freeze them in motionless nonprogressions. There is usually background motion, although it is created by other than tonal-triadic means. The materials he uses imply a motion that only rarely occurs *on its own level*. There is irony in this music: the tonal materials suggest movement, but they do not move; in the background, the pieces do move, but by nontonal means.

The Sonata for Two Pianos is a typical neoclassical work. The first movement adheres to the outlines of classical sonata-allegro form, but each section is motivically self-contained and harmonically static. The "bridge" section is in no real sense a transition, but rather a short yet independent static block. Even the "development" section, though less overtly static, does not have the sense of drive common in tonal music. Thus, the sections are really moments. Not surprisingly, the proportions contribute to the form. As Table 10.4 demonstrates, many contextually significant proportions derive from a single ratio. Because the ratio is slightly more than 1:1, the proportions are close to equality. The subtlety is greater than in *Les Noces*, however, where Stravinsky uses approximations of equality. In the Sonata, the ratios range up to 1.11 (with an exception at 1.20); the general feeling, then, is of moments of slightly greater length than other sections.

Table 10.4. Sonata for Two Pianos—Sectional Durations and Proportions

Section	Duration in Seconds	Pitch Centricity (static sections only)
	movements	
I	242.4	
II	262.5	
III	100.4	
	main sections	
I. exposition	124.8	
development	38.1	
recapitulation	64.3	
coda	15.2	F
II. theme	96.0	G
variations	166.5	
III. theme 1	41.6	
theme 2	28.7	
transition	4.2	G
recap. theme 1	25.9	
	subsections	
I. exp. theme 1	27.6	F
exp. bridge	4.3	G
exp. theme 2	30.5	C
recap. theme 1	33.3	C
recap. bridge	4.3	C
recap. theme 2	26.7	F
II. variation 1	41.1	G "root"; "key" of D
variation 2	40.0	
variation 3	49.4	
variation 4	36.0	D

Proportional ratios slightly greater than 1:1 (first two movements only):

(exp. repeated) : (devel. + recap. + coda) = 1.06
(exp. theme 1 + bridge) : (exp. theme 2) = 1.11
(exp. theme 2) : (exp. theme 1) = 1.11
(recap. theme 1) : (recap. theme 2 + bridge) = 1.07
(recap. theme 2 + coda) : (recap. theme 1 + bridge) = 1.11
(exp. theme 1) : (recap. theme 2) = 1.03 (both themes "in" F)

continued

Table 10.4. *continued*

(recap. theme 1) : (exp. theme 2) = 1.09 (both themes "in" C)
(recap. without coda) : (exp. not repeated) = 1.03
(static "in" C) : (static "in" F) = 1.02

(theme + var. 4) : (var. 1 + var. 2 + var. 3) = 1.01
(var. 3) : (var. 1) = 1.20
(var. 1) : (var. 2) = 1.03
(var. 2) : (var. 4) = 1.11

(mvt. II) : (mvt. I) = 1.08

The third movement, which is not harmonically static, uses different proportions—3:2 (1.50), 5:4 (1.25), and golden mean (1.62) :

3:2
(mvt. III) : (theme 1 + recap. theme 1) = 1.49
(theme 1) : (theme 2) = 1.45

5:4
(theme 1) : (theme 2 + trans.) = 1.26
(theme 2 + trans.) : (recap. theme 1) = 1.27
(theme 1 + theme 2 + trans.) : (theme 2 + trans. + recap. theme 1) = 1.27

golden mean
(theme 1 + recap. theme 1) : (theme 1) = 1.62
(theme 1) : (recap. theme 1) = 1.61

Also, interestingly:

(mvt. II + mvt. III) : (mvt. I) = 1.50

The following durations indicate the total time spent in each centricity throughout the Sonata. Durations take into account both harmonically static *and* active passages. The decision of what pitch class (if any) governs a passage in a chromatic and/or transitional context is sometimes difficult to determine; thus, the following durations should be considered approximate:

Movement I	"in" F	97.1
	"in" C	120.0
	"in" G	4.3
	"in" A♭	21.0
Movement II	"in" G	131.8
	"in" D	89.8
	"in" C	40.9
Movement III	"in" F	67.5
	"in" G	32.9

Proportional ratios of time spent in main centricities (both slightly greater than 1:1):

("in" G) : ("in" F) = 1.03
("in" F) : ("in" C) = 1.02

This proportional idea is carried over into the second movement, a set of variations. The theme and the first and fourth variations are static; the second and third variations are not. This introduction of motion is significant because the finale is rarely static. Thus, internal proportions in the last movement are not as important to formal coherence as in the earlier movements—progression takes over as the form becomes linear. We should not be surprised that the proportions between the clearly delineated large sections of the finale do not continue the subtle ratio of the first two movements: hearing sophisticated balances when motion influences our perception of time is difficult.

There is one further consequence of the "slightly greater than 1" ratio. As Table 10.4 shows, this ratio is reflected in the total amounts of time spent in each of the three main pitch centricities of the Sonata—the "keys" of F, G, and C. Applying the basic ratio to total amounts of time spent in tonal areas is apparently a new development for Stravinsky; it does not depend directly on either stasis or sectionalization. The Sonata thus extends the principle of proportional balance into a new realm, and the result is an elegantly proportioned work.

Agon is possibly Stravinsky's most discontinuous conception. Moments (which do not always coincide with the movements as labeled in the score) are differentiated by instrumentation, tempo, compositional procedures (some of the music is twelve-tone), harmony, recapitulation, and melodic material. Many moments contain submoments, and moments are grouped into five types. Some of these groups are contiguous but others include sections from different parts of the piece (see Table 10.5).

Table 10.6 shows the proportional system. The basic ratio is 1.19:1. This ratio is not as strange as it might seem because it is really $\sqrt[4]{2}$:1. The musical significance of $\sqrt[4]{2}$ is that the series doubles every fourth term (for example, the subseries 40.2, 80.4, 160.8, 321.6, 643.2 is in the ratio 2:1). Thus, sections twice as long as other sections are often encountered in *Agon*. The composer is therefore able to utilize a sophisticated series that also provides readily perceivable doubling of durations.

The series in the first column of Table 14.6, a sequence of numbers increasing according to the basic ratio, is simply a reference. The second column gives actual durations of all moments (except the longest one, E411) plus selected moment groups. Comparison of these two columns shows how very close to the $\sqrt[4]{2}$:1 series the sectional durations are (the fourth column gives the percentage of deviation)—only one approximation is poor. Equally amazing is the range of the series: durations ranging from 40.7 to 1109.5 seconds approximate terms of the reference series.

The series in Table 10.6 does not explain durations of submoments. Another series, using the same ratio $\sqrt[4]{2}$:1 but starting from a different number, determines the durations of submoments from A61 and E411 (see Table 10.7). The approximations are as close as in Table 10.6, and the series is carried onto large structural levels by the durations of groups of adjacent submoments. The series of

Table 10.5. ***Agon*—Delineation of Sections**

Section	Measures	Duration in Seconds	Name in Score	Defining Characteristics
		moments groups		
A	1–121; 561–620	296.0		framing fanfares
B	122-145; 254-277; 387-410	122.1		refrain
C	146–253	194.4		neoclassical dances
D	278–386	161.6		"ABA" forms
E	411–560	335.4		serial
		moments		
A1	1–60	81.5	Pas-de-Quatre	fanfarelike
A61	61–121	133.7	Double and Triple	attacca between Double and Triple
B122	122–145	40.7	Prelude	
C146	146–163	65.8	Saraband-Step	solo vln, xyl., 2 trb.
C164	164–184	60.6	Gailliarde	fls., solo strings, harp, mand., piano
C185	185–253	68.0	Coda	chamber orchestration
B254	254–277	40.7	Interlude	return of B122
D278	278–309	47.6	Bransle Simple	"ABA" form
D310	310–335	47.0	Bransle Gay	castanets ostinato; "ABA" form
D336	336–386	67.0	Bransle Double	"ABA" form
B387	387–410	40.7	Interlude	return of B122
E411	411–560	335.4	(several)	serial
A561	561–620	80.8	Coda	recapitulation
		submoments		
a61	61–80	41.9	Double Pas-de-Quatre	4/8 time
a81	81–95	38.3	Double Pas-de-Quatre	5/8 time, more pointillistic
a96	96–121	53.5	Triple Pas-de-Quatre	4/8 time, coda
b122	122–135	20.7	Prelude	overlapping figures
b136	136–145	20.0	Meno mosso	high cb., low fls., etc.
c146	146–153	29.8	Saraband-Step	ends with strong cadence
c154	154–163	36.0	Saraband-Step	answering section
c164	164–170	17.6	Gailliarde	
c171	171–178	28.3	Gailliarde	add piano and timp., repeat
c179	179–184	14.7	Gailliarde	recapitulation of c164
b254	254–267	20.7	Interlude	overlapping figures
b268	268–277	20.0	Meno mosso	high cb., low fls., etc.
d278	278–287	13.9	Bransle Simple	trumpets fanfare

Table 10.5. *continued*

Section	Measures	Duration in Seconds	Name in Score	Defining Characteristics
			submoments continued	
d288	288–298	15.7	Bransle Simple	pointillistic orchestration
d299	299–309	18.1	Bransle Simple	recapitulation of d278
d310	310–320	21.5	Bransle Gay	flutes and bassoons
d321	321–331	17.9	Bransle Gay	flute solo
d332	332–335	7.5	Bransle Gay	recapitulation of d310
d336	336–351	25.7	Bransle Double	tpt., trb., strings
d352	352–364	13.9	Bransle Double	add flute and piano
d365	365–372	12.9	Bransle Double	recapitulation of d336
d373	373–386	14.5	Bransle Double	coda
b387	387–400	20.7	Interlude	overlapping figures
b401	401–410	20.0	Meno mosso	high cb., low fls., etc.
e411	411–451	121.7	Pas-de-Deux	violin solo with strings
e452	452–462	16.5	Pas-de-Deux	strings; irregular meters
e463	463–494	44.8	Pas-de-Deux	"ABA" form
e495	495–503	16.5	Coda	energetic
e504	504–511	45.0	Doppio lento	mand., harp, solo strings
e512	512–519	13.9	Quasi stretto	first real transition
e520	520–538	33.0	Four Duos	lower strings pizz., trbs.
e539	539–552	27.5	Four Trios	string fugato
e553	553–560	16.5	Four Trios	transition to recap. of A1

"Moment groups," "moments," and "submoments" represent three distinct but hierarchically adjacent levels of structure. Moments are self-contained sections defined by some of the following characteristics: static harmony, texture, compositional procedure, orchestration, tempo, melodic material, form. The analytic decision of what constitutes a moment in the context of *Agon* is perceptual and (initially) intuitive. Justifications for such decisions can be given—"defining characteristics" indicate some, but never all, of the pertinent factors that suggest hearing the sections on the indicated structural levels. Moments that share common materials, textures, and/or procedures are grouped together into moment groups, whether or not the constituent moments are temporally adjacent. Distinct sections that are not as strongly delineated as moments are labeled submoments. Most, but not all, moments contain submoments.

"Duration" is calculated according to Stravinsky's metronome indications, from the first attack point of a section to the end of the final sound of that section (if it is followed by a between-movement pause of indeterminate length) or to the first attack point of the subsequent section (if it follows *attacca*).

Fermatas are estimated to add one second.

Table 10.6. ***Agon***—Proportional Relationships Between Moments and Moment Groups

1:1.19 Series	Duration in Seconds	Moments	% Deviation from Series	Remarks
40.2	40.7	B122	1.2%	
	40.7	B254	1.2%	
	40.7	B387	1.2%	
47.8	47.0	D310	1.7%	
	47.6	D278	0.4%	
56.8	60.6	C164	6.7%	poor approximation
67.6	65.8	C146	2.7%	
	67.0	D336	0.9%	
	68.0	C185	0.6%	
80.4	80.8	A561	0.5%	
	81.5	A1	1.4%	
95.6	94.6	D278 + D310	1.0%	two adjacent moments
113.6	114.0	D310 + D336	0.4%	two adjacent moments
135.2	133.7	A61	1.1%	
160.8	161.6	D	0.5%	moment group D
191.2	194.4	C	1.7%	moment group C
227.2	235.1	(B122 + C) or (C + B254)	3.5%	group C + one framing B moment; weak approximation
270.4	275.8	B122 + C + B254	2.0%	group C + both framing B moments
321.6	321.7	A1 + A61 + B122 + C146	0.0%	first four moments
382.4	376.1	B387 + E411	1.6%	two adjacent moments
454.2	456.9	B387 + E411 + A561	0.6%	last three moments
540.8	537.7	D + B387 + E411	0.6%	five adjacent moments
643.2	631.4	A + E	1.8%	two moment groups
764.8	753.5	A + B + E	1.5%	three moment groups
908.4	915.1	A + B + D + E	0.7%	four moment groups
1081.6	1109.5	A + B + C + D + E	2.6%	five moment groups (entire composition)

All moments other than the exceptionally long E411 have durations approximating a 1:1.19 series (all approximations are remarkably close, except for C164). This series is shown for comparison with the actual durations—it has no direct relevance to *Agon* except by such comparison. This series is interesting, however, because its ratio is 1 to the fourth root of 2; in other words, the $(n+4)$th term of the series is twice the nth term. Thus, many moments are twice as long as other moments (for example, A561 and A1 are twice B122, B254, and B387; A61 is twice C146, D336, and C185; and so forth). Such nearly exact doublings of duration have a decided impact on the sense of formal balance in *Agon*. Also important are certain virtually identical durations—A1 and A561, the framing moments of the entire composition; B122, B254, and B387, the virtually identical Prelude and Interludes; adjacent moments D278 and D310, whose combined duration is also significant in the proportional scheme.

The chart goes well beyond the three structural levels of submoments, moments, and moment groups. It goes to the ultimate background—the duration of the entire piece. It is remarkable that this one proportional scheme governs durations from the individual moments through perceptually relevant "meaningful" (that is, adjacent or similar) groupings of moments to the total span of the work.

Notice the tendency of certain durations to cluster around certain terms of the main series (40.2, 47.8, 67.6, 80.4). This indicates further the pervasiveness of the ratio. The duration of every moment except E411 is determined by the series; every term of the series approximates at least one significant duration; many chains of

adjacent moments figure in the higher durations of the series; sums of durations of moment groups are also determined by the series. These facts go a long way toward explaining the mysterious sense of unity in *Agon*, despite the disparity in materials and compositional procedures and despite the extreme discontinuity between moments.

Table 10.7. ***Agon***—Proportional Relationships Between Submoments of A and E

1:1.19 Series	Duration in Seconds	Submoments	% Deviation from Series	Remarks
13.7	13.9	e512	1.5%	
16.3	16.5	e452	1.2%	
	16.5	e495	1.2%	
	16.5	e553	1.2%	
19.3	19.6	e495+	1.6%	includes preceding silence
23.0	22.5	e504	2.2%	not counting repeat
27.4	27.5	e539	0.4%	
32.6	33.0	e520	1.2%	
38.7	38.3	a81	1.0%	
46.0	44.8	e463	2.6%	
	45.0	e504	2.2%	
54.8	53.5	a96	2.4%	
65.2				no meaningful approximation
77.4	77.0	e520 + e539 + e553	0.5%	
	75.4	e495 + e504 + e512	2.6%	preceding three submoments; "Coda"
92.0	91.9	e504 + e512 + e520	0.1%	three adjacent submoments
	90.9	e512 + e520 + e539 + e553	1.2%	last four submoments
	91.8	a81 + a96	0.2%	two adjacent submoments
109.6				no meaningful approximation
130.4				no meaningful approximation
154.8	152.4	e495 + e504 + e512 + e520 + e539 + e553	1.6%	last six submoments
184.0	182.9	e411 + e452 + e463	0.6%	other submoments of E411
219.0	215.2	A1 + A61	1.8%	first three submoments
260.8	256.0	A1 + A61 + B122	1.8%	first three moments

All submoments of A61 and E411 are involved in this series of approximations of a 1:1.19 series (a series different from but having the same ratio as the approximation series for moments shown in Table 10.6). All approximations are remarkably close, although three terms of the series do not correspond to perceptually meaningful durations in *Agon*. Most submoments (except a61 and e411) appear as entities. For approximations of larger durations, adjacent submoments (usually from the beginning or ending [except for the recapitulatory coda] of the piece) are summed. This procedure reflects the framing nature of the opening and closing of the work—not only the material but also the proportions produce an archlike structure. As in the previous analysis of moment lengths, we find doublings of length (for example, e539 is twice e512; e520 is twice e452, e495, and e553, and so forth). Also important are such identities of duration as e452, e495, and e553; e463 and e504; the successive groups of submoments e495 + e504 + e512 and e520 + e539 + e553; the interlocking groups of submoments e504 + e512 + e520 and e512 + e520 + e539 + e553; also significant is the fact that e539 + e553 = e504.

Table 10.8. ***Agon***—Other Significant Proportions in Submoments

Moments A1 and A61
a61 = a81, to within 1.6 seconds
a61 + a81 = A1, to within 1.3 seconds
(a81 + a96) : A1 = 1.13
Moments B122, B254, and B387
b122 = b136 = b254 = b268 = b387 = b401, to within 0.7 seconds
Moments C146, C164, and C185
C185 = C146, to within 2.2 seconds
c164 + c179 = c154, to within 1.7 seconds
c154 : c146 = 1.21 (adjacent submoments of C146)
c164 : c179 = 1.20 (similar submoments of C146)
(c164 + c179) : c171 = 1.14 (all submoments of C146)
Moments D278, D310, and D336
adjacent submoments increasing in duration according to ratio:
d288 : d278 = 1.13
d299 : d288 = 1.15
d310 : d299 = 1.19
d321 = d299, to within 0.2 seconds
d352 + d365 = d365 + d373 = d336, to within 1.7 seconds (all submoments of D336)
d336 : d310 = 1.20 (first submoments of two successive moments)
(d321 + d332) : d310 = 1.18 (adjacent submoments)
d310 : d321 = 1.20 (adjacent submoments)
Moment E411
e463 = e504 = e539 + e553, to within 1.0 seconds
e539 is twice the length of e512, to within 0.3 seconds
e520 is exactly twice the length of e452, e495, and e553
(e411 + e452 + e463) : (e495 + e504 + e512 + e520 + e539 + e553) = 1.20 (subdivision of E411 at largest silence)
e520 : e539 = 1.20 (adjacent submoments)
(e411 + e452) : e411 = 1.14
e452 : e512 = e495 : e512 = e553 : e512 = 1.19

Table 10.7, like that of Table 10.6, contains several doubling relationships. There are also a number of significant equalities of durations shown in Tables 10.6 and 10.7. Table 10.8 demonstrates additional manifestations of the basic ratio, several equalities of durations and further doublings of durations.

Careful study of Tables 10.6, 10.7, and 10.8 should indicate the impressive pervasiveness of the basic ratio. The choice of this particular ratio was fruitful because it allows for two long chains of proportionally related durations and includes several 2:1 ratios. The closeness of approximation is strong evidence that these series do indeed operate structurally. The participation of every moment and submoment (except the single longest moment, the twelve-tone E411, which is carefully set apart) in one of the two series testifies to the thoroughness of Stravinsky's system. The fact that both series are projected onto high levels, thus determining durations up to that of the entire composition, is further proof of the significance of this construction. The higher order terms of both series are approximated by groups of moments chosen not randomly but in accordance with temporal adjacency and/or motivic similarity. *Agon*, Stravinsky's most mosaiclike, most discontinuous, seemingly least consistent work, is in fact unified by a tight system of durational proportions. What results from his great sensitivity to sectional lengths is a beautifully balanced composition in which diverse sections balance one another in numerous sophisticated ways. The composer's achievement is extraordinary; it bespeaks both an incredibly well developed intuition and a deep understanding of the implications of discontinuity.

Discontinuity implies nonlinearity of musical time. The idea that time does not progress from moment to moment, does not even really flow, is common to much twentieth-century music; this notion is not only Stravinsky's. There is, in addition, ample evidence that such a conception of time is endemic to much contemporary art and culture. Despite the irrationality of time, despite the fragmented nature of human existence (surely made painfully acute to Stravinsky and his contemporaries by World War I), we do grow up, and grow old, and die. Our bodies progress inexorably through time, even if our daily lives do not. This contradiction between a middleground life of discrete moments and a background life of process aimed toward the grave parallels (all too neatly?) the formal procedures of Stravinsky's discontinuous works. If he were an isolated composer, this comparison between musical logic and twentieth-century concepts of time might be too pat. But Stravinsky's discontinuities derive in part from those of Debussy, parallel those of Ives, Webern, and Varèse, and anticipate those of Messiaen and the Darmstadt school. Stravinsky's aesthetic belongs to an important mainstream of modern musical thought.

His formulation of discontinuous time is particularly elegant because his music's unexpected juxtapositions are the starting point, not the whole essence, of his aesthetic. Stravinsky deals with the formal implications of discontinuity—the

creation of static forms that are revealed moment by moment. There is a subtle tension in his music, as this middleground stasis of form is contradicted by foreground details and background pitch connections that do progress through time.

Stravinsky went beyond the creation of discontinuities and static forms and found a way to convince the ear of the functional equivalence of sections of different lengths. Therein lies his great originality. He invented a compositional technique, apparently intuitively, that provided the means to create structures that cohere despite vastly different durations and extreme discontinuities. This technique allowed him to compose pieces that are beautiful statements of the contemporary aesthetic of nonlinear time.