
THE EVOLUTION OF FORM IN THE MUSIC OF ROGER REYNOLDS (I)

Michael Boyd

Abstract: Throughout his career, Roger Reynolds has studied perception and used this knowledge in an overt manner to shape many of his compositional decisions. Though this concern affects the ways that he works with many musical parameters, its influence is perhaps most clearly manifested in his global temporal designs. This article examines how he has approached form over the course of his career. Reynolds's initial compositional work from the early 1960s employed formal proportions that were derived from rows. Since 1970 Reynolds has used logarithmically expanding and contracting proportions to define sectional durations in his music to the near-exclusion of other designs. At the end of the 1980s and into the early 1990s, Reynolds began to look for sources of 'alternative proportional authority' such as chaos theory, while in more recent compositions his approach to formal design has been more variable.

Roger Reynolds (photo: Malcolm Crowthers)



For the past fifty years, Roger Reynolds (b. 1934) has composed compelling, diverse music that draws from a variety of influences including American experimental, European avant-garde, and Asian music. Beyond these basic influences, perception and cognition are at the forefront of Reynolds's interests. Throughout his career, this composer has studied perception and used this knowledge in an overt manner to shape many of his compositional decisions. Though this concern affects the ways that Reynolds works with spatialization, pitch structures, transformation procedures, instrumentation, text setting, and other aspects of composition, its influence is perhaps most clearly manifested in his global temporal designs.

The vast majority of Reynolds's compositions employ logarithmic formal proportions, for reasons that will be discussed at length shortly. This paper will examine how such structures originated and have been manifested in Reynolds's compositions over the course of his career, and then present a detailed analysis of their employment in a single work from the middle of his career, *The Palace (Voicespace IV)* (1978–80) for baritone and computer-generated four-channel tape. This analysis will link Reynolds's conceptual background for *The Palace*, the more general portion of the creative act, with its specific temporal design, one of the more technical aspects of his creative process, thus demonstrating a clear connexion between overriding principles and compositional methods in his music. For both the introduction to Reynolds's temporal

¹ The Roger Reynolds Collection at the Library of Congress was established in 1998, and contains the composer's correspondence, writings, and composition materials. Though the collection process is ongoing, the archive currently houses over 30 of Reynolds's works. A partial finding aid is available on the Library of Congress's website for the collection (<http://lcweb2.loc.gov/diglib/ihas/html/rreynolds/rreynolds-home.html>). For a more formal introduction to the collection see Boyd 2008. (NB: a detailed list of references will be included with Part II of this article – Ed.)

designs and the analysis that follows, sketches from the Roger Reynolds Collection at the Library of Congress will be used to provide insight into the composer's creative process.¹

Over the course of his career, Reynolds's music has been discussed in many different forums, though detailed, analytic approaches to his work have been more limited in quantity.² The composer's own writings comprise one of the most significant resources in this area. *A Searcher's Path* and *Form and Method*, Reynolds's latter two books published in 1987 and 2002 respectively, present detailed depictions of his working methods, addressing both general principles and the mechanics of commonly used compositional techniques. Reynolds has also written several journal articles and book chapters, most notably in *Perspectives of New Music* and *Music Perception*, which address specific topics relating to his music. 'Thoughts on Sound Movement and Meaning', for example, discusses the composer's interest in and work with electro-acoustic spatialization.³

Other resources that provide detailed perspectives on Reynolds's music have appeared more frequently within the past ten or 15 years. Authored by Reynolds and a team of psychologists led by Stephen McAdams, the Winter 2004 issue of *Music Perception* was entirely devoted to Reynolds's work *The Angel of Death*, a piece that functions both as a concert work and the medium for audience perception study. Additionally, French musicologist Philippe Lalitte's doctoral work at the Université Paris-Sorbonne (Paris IV) focused on Reynolds's music, in particular *Archipelago* and *The Angel of Death*. Lalitte's dissertation largely draws on and expands his research as part of *The Angel of Death* research team, though it also importantly contextualizes Reynolds's temporal practices with those of prominent 20th-century composers such as Karlheinz Stockhausen, Iannis Xenakis and Elliott Carter. Percussionist Julie Licata's doctoral work also focused on Reynolds, in particular his *Watershed I/IV* (solo percussion with real-time computer sound spatialization, 1995). Licata's dissertation examines the form of this work as it relates to performance gestures and instrument configurations. The present paper builds on these previous studies, and is unique in that it presents a chronological view of Reynolds's evolving formal practices and a detailed analysis of one of his most striking works from the late 1970s.

Early Approaches to Form

Roger Reynolds's initial compositional work dates from the early 1960s and his approaches to form during this time were significantly influenced by his study with Roberto Gerhard at the University of Michigan at Ann Arbor. Reynolds, whose father was an architect and who himself trained as an engineer and worked for a time in the missile defense industry, found early on that 'planning and laying things out ... was natural to me'.⁴ Before working with Gerhard, the composer depended on 'proposed and posited structures', employing formal designs with which he was already familiar. Gerhard presented his students with his own ways of working. With regard to form, Gerhard used proportional structures that were derived from rows, such as 2:3:5, and these proportions were used at multiple structural levels (entire piece, sections,

² See the composer's website (www.rogerreynolds.com) for a worklist, bibliography, list of recordings, and other information.

³ Reynolds 1978.

⁴ Reynolds 2009; all unidentified quotes in the following four sections draw from this interview.

sub-sections, and so forth) providing what Reynolds calls a 'normative sense of proportionality'. Gerhard emphasized that such an approach was a 'principled way of going about things' that one could modify as necessary, referring to it as 'scaffolding' that was removed and not perceived once a structure was built.⁵ Though Gerhard emphasized that these methods were his own, Reynolds has noted that some of the students, himself included, adopted Gerhard's approaches to varying degrees. The importance of this approach for Reynolds's development was its demonstration of a principled way through which one could derive a sort of architectural authority, about which the composer has noted that there 'always seems to be some advantage to having something one is working with or against, something one can respond to'.

This approach to form can be observed in several of Reynolds's compositions from the early 1960s including *Wedge* (1961, chamber ensemble) and *String Quartet* (1961), and is presented in a particularly clear manner in the latter work.⁶ This quartet is divided into 12 sections that alternate rhythmically active and passive material. The active sections contain reiterative passages that divide the beat into as many as seven parts as well as sweeping gestures that cover multiple octaves, while the passive sections are characterized by sustained pitches that at times span several measures. The divisions between these sections are clearly demarcated in the score by double barlines at the end of measures 6, 16, 42, 48, 72, 91, 107, 141, 185, 210, and 242. Except for the first six measures, which are notated in 3/4, the quartet uses a 4/4 time signature; tempo changes are noted at the beginning of each section.

Figure 1 summarizes data relevant to sectional durations in *String Quartet*:

Section number	Measure numbers	Active or passive	Tempo (quarter/min)	Total # of quarters	Duration (rounded to nearest sec)	Ratio of duration to section 1
1	1–6	A	138	18	8"	1:1
2	7–16	P	138	40	17"	1:2
3	17–42	A	160	104	39"	1:5
4	43–48	P	60	24	24"	1:3
5	49–72	A	132	96	44"	1:6
6	73–91	P	80	76	57"	1:7
7	92–107	A	120	64	32"	1:4
8	108–141	P	100	136	82"	1:10
9	142–185	A	132	176	80"	1:10
10	186–210	P	80	100	75"	1:9
11	211–242	A	120	128	64"	1:8
12	243–272	P	72	120	100"	1:12

Figure 1

⁵ See Gerhard's lectures, 'Functions of the series in twelve-note composition', delivered at the University of Michigan at Ann Arbor in Spring 1960, as published in Meirion Bowen (ed.), *Gerhard on Music: Selected Writings* (Aldershot: Ashgate Publishing Ltd, 2000), pp. 157–173 (Ed.).

⁶ *Wedge* is recorded on 'Music from the ONCE Festival, 1961–66' (New World Records 80567, 2003)

The first three columns of Figure 1 label the sections numerically, identify the measure numbers associated with each, and indicate the active or passive status of each section. The next three columns of this table list the tempo (quarter notes per minute), total number of quarter notes, and approximate duration (rounded to the nearest second) of each section. The final column lists ratios that compare the duration of each section with the length of Section 1, the shortest section, the significance of which will be discussed shortly.

Over the course of the work, section lengths shift from very short to much longer, a trend emphasized by the fact that the piece begins with the shortest section (8") and ends with the longest (100"). The relationship between durations used in this piece is essentially linear, with durations of successively greater magnitude increasing by approximately eight seconds, the length of the first and shortest section. As a result the ratios between section durations in this work are exactly or nearly characterized by integers between one and twelve with the exception of nine, as summarized in the final column of Figure 1. Extracting the second number from each of these ratios creates a series of twelve integers (1, 2, 5, 3, 6, 7, 4, 10, 10, 9, 8, 12) that is suggestive of a relationship between the work's formal proportions and a tone-row structure; the repetition of 10, row members eight and nine, will be discussed shortly.

If these numbers are used to order a chromatic collection starting with the pitch-class C, the follow row is produced: C, C#, E, D, F, F#, D#, A, A, G#, G, B. While derivations of this row are not presented obviously throughout the entire work, its usage is apparent and particularly clear near the composition's end. For example, the cello plays the following succession of pitch-classes in measures 243–55 (Example 1): C#, D, F, D#, F#, G, E, A#, B, A, G#, C. This series is one half-step higher than the row built from C earlier, with its ninth member raised one half-step. The first violin's final gesture, mm. 260–72, also reflects this structure (Example 2). The pitch-classes A#, B, D, C, D#, E, C#, G#, F#, F, A are sounded in mm. 260–268, the same structure built from A# without its eighth member G (again the ninth member is one half-step higher than in the row built from Figure 1). The gesture continues with similar material in the measures that follow, mm. 268–72 (A#, B, D, C, E, C, G, G#, F#, F, G, A), repeating most of this row and prominently incorporating the previously missing G. The fact that in each of these presentations of the row the ninth member is one half-step higher than expected suggests that the original series was likely 1, 2, 5, 3, 6, 7, 4, 10, 11, 9, 8, 12, and the length of Section 9 was shortened slightly for aesthetic reasons.

Example 1:
String Quartet (1961),
cello mm. 243–55

Adagio ♩ = 72

Example 2:
String Quartet (1961),
violin 1 mm. 260–68

This approach, using a row to create duration proportions, forms a link between a work's pitch material and its formal structure, and clear precedents for this practice exist. It is notable that this connexion exists at the compositional level, thereby creating an internal coherence for the composer, though it is not likely audible to listeners. The idea of relating section durations proportionally carried into Reynolds's subsequent work, though notably he began to shift away from deriving formal proportions from row structures and started searching for approaches that would be more clearly audible to listeners.

The Inception of the Logarithmic Series

In the mid-1960s, approximately 1965 or 1966, Reynolds began to realize that Gerhard's approach to proportionality was 'not working for me ... his ideas were his own and not appropriate for what I was trying to do'. The inspiration for a new direction in this domain came in the winter of 1966. Reynolds had been in Japan for a month and, on the way to Europe, stopped in Hong Kong where he found a copy of an English translation of Paul Fraisse's *Psychology of Time* in a bookstore. This book had a significant impact on Reynolds and his ideas about time and the perception of musical events in time. Specifically he realized that one possible way of dealing with time was to think of it as a 'fluctuating landscape of sections' that grew apart and together, reflecting the notion, discovered through Fraisse, that the human sensory system responds to changing input rather than repetition.⁷ This basic premise influenced the structure of *Blind Men* (1967, mixed voices and chamber ensemble), which features what the composer calls 'timed mixtures', sections where basic material is improvised on for a certain period of time. In this work the succession within these sections is relatively static and non-evolutionary, a characteristic observable in sections of other of Reynolds's works from the late 1960s.

Upon joining the University of California San Diego faculty in 1969, Reynolds searched for psychologists there who were studying time. He found and collaborated with Donald Norman who was working with memory and attention, and merged Norman's ideas with those of Fraisse. These interactions led Reynolds to work increasingly with formal fluctuations, and, in order to structure these changes, he came to the idea of using the 'so-called logarithmic series'.

Since 1970, Reynolds has used logarithmically expanding and contracting proportions to define sectional durations in his music to the near-exclusion of other designs.⁸ In an informal interview, the composer commented that he uses temporal structures derived from logarithmic series because change is a highly perceptible phenomenon, and, by extension, 'changing change', increasing durations by increasing amounts or decreasing durations by decreasing amounts, would perhaps create the greatest perceptual impact in this dimension.⁹ When listening to a work by Reynolds that is structured in this manner, one indeed hears that sectional durations are dynamic, continually expanding or contracting.¹⁰ The specific numbers that are used to create such

⁷ Another way in which Fraisse 1963 had an impact on Reynolds was through the concept of the 'perceptual present'. His perceptual present, which Reynolds discusses in Reynolds 2002, 13–14, constitutes the threshold of one's short-term memory where one is not yet concerned with that moment's relationship with past and future events. This perceptual present, between seven and ten seconds, is used by Reynolds as the minimum duration used to present any structural aspects of his music.

⁸ Reynolds has also used proportions derived from texts and attractors from chaos theory to shape the macro design of his music. See Reynolds 2002, 17–18.

⁹ Reynolds 2005b.

¹⁰ Reynolds comments on the perception of sectional borders in Reynolds 2002, 10–13.

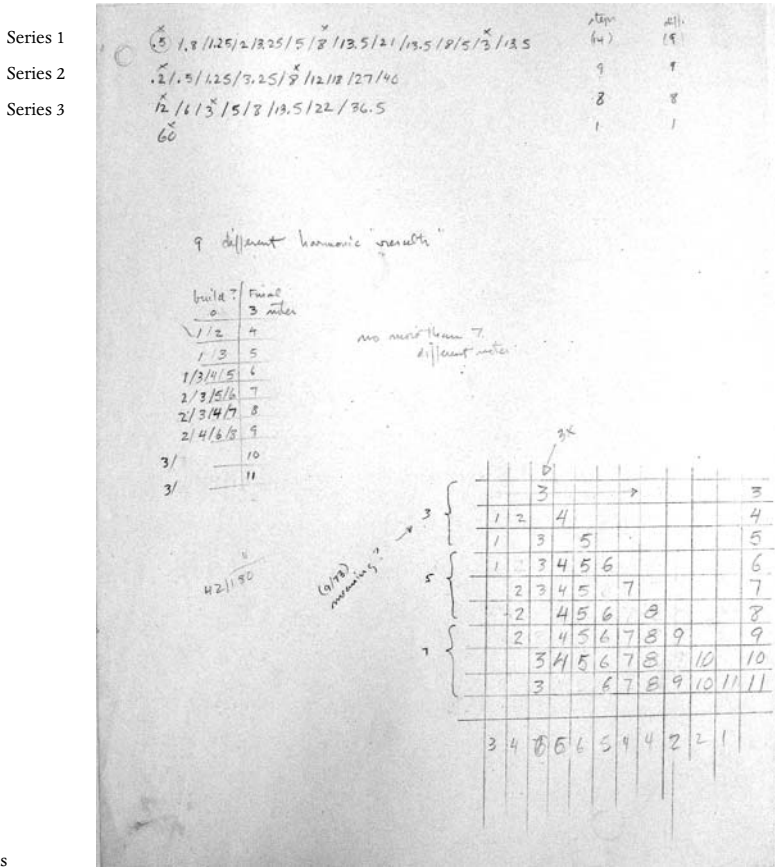
structures are, of course, not audible, but the rate of expansion or contraction that results from their usage is a perceptible temporal characteristic.

The origin of this compositional tool can be traced to *Again* (1970), a chamber work for pairs of sopranos, flutes, trombones, percussionists, and double basses, along with quadraphonic sound.¹¹ The earliest sketches for this work found in the Roger Reynolds Collection consist of a list of internal rhythms of the human body and prose notes that refer to Fraisse and Charles Darwin's comments on time and rhythm. On subsequent sketches, one finds calculations and logarithmic series that are translated into graphic proportion plans (see Examples 3 and 5). At the top of Example 4 one finds three numerical series that are reproduced below and labeled one through three:

Figure 2

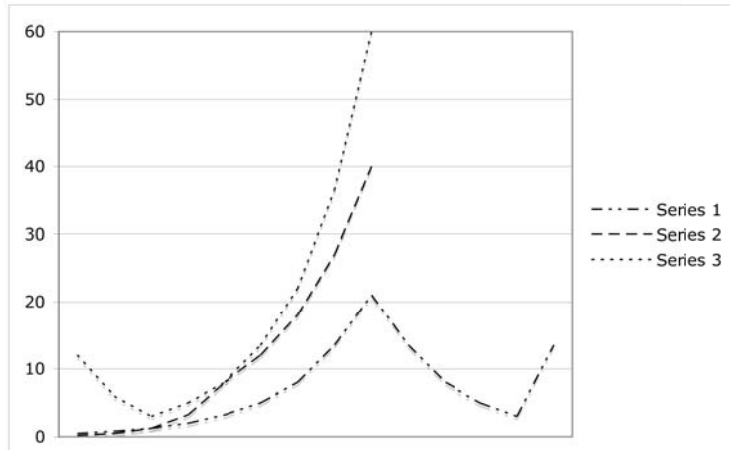
Series 1	.5	.8	1.25	2	3.25	5	8	13.5	21	36.5	60	100	160	260
Series 2	.2	.5	1.25	3.25	8	20	50	125	320	800	2000	5000	12500	32000
Series 3	12	6	3	1.5	.75	.375	.1875	.09375	.046875	.0234375	.01171875	.005859375	.0029296875	.00146484375

These series are displayed graphically in Example 4, where their logarithmic curvature is clearly visible, expanding at varying rates; Series 1 exhibits the slowest speed of expansion, while Series 2 and 3 increase at successively greater rates.

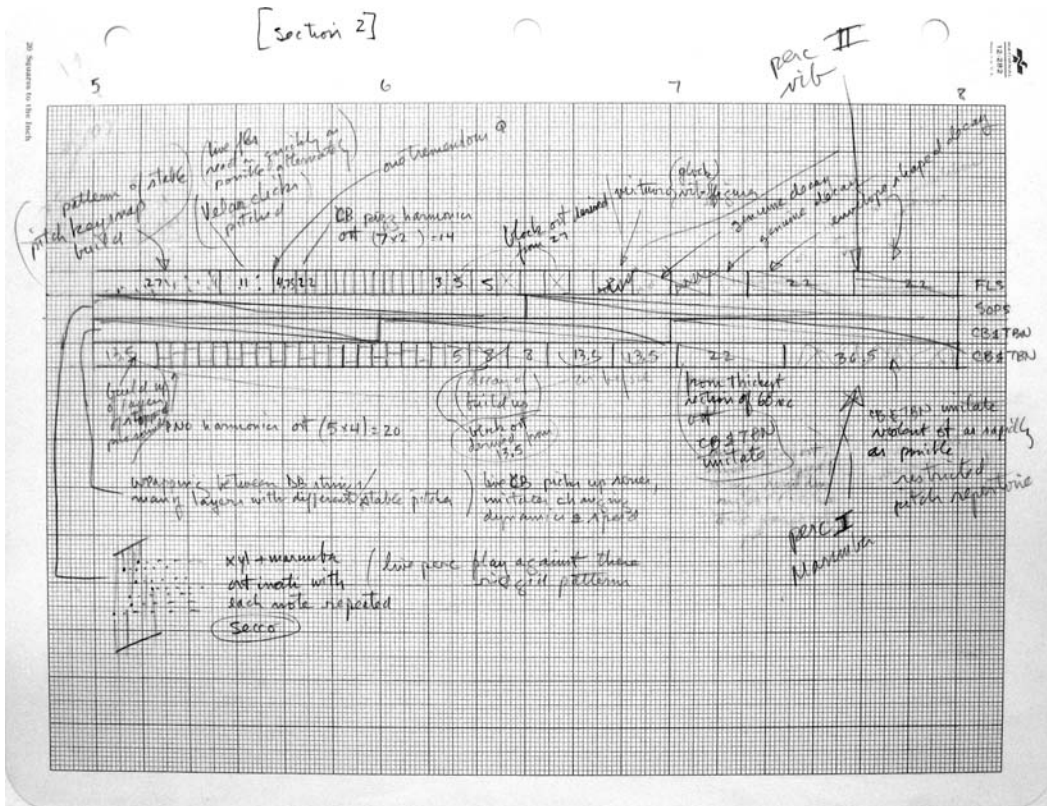


Example 3: *Again* proportion calculations

¹¹ *Again* is published by C.F. Peters Corporation (No. 66249, 1970).



Example 4: Again proportion series



Example 5: Again proportion plan (section 2)

On later pages that document the genesis of *Again*, these numerical series are translated into graphic proportion plans of varying detail; specifically, each numerical value corresponds to a section length of that many seconds. Example 5, labeled '[Section 2]', is one of the more developed proportion plans that Reynolds created for this work. The numbers 5, 6, 7, and 8 found at the top of the page correspond to the beginning of the fifth, sixth, seventh, and eighth minutes of the work, thus the smallest horizontal unit of the graph paper represents one second. In the upper-half of the page one finds four layers that stretch horizontally from the fifth to the eighth minute mark. These layers are associated with segments of the ensemble and labeled at the far right

of the page: FLS (flutes), SOPS (sopranos), CB&TBN (contrabass and trombone), and CB&TBN (contrabass and trombone). Each layer is subdivided horizontally into smaller units that represent sectional divisions in *Again*. It is in this domain that Reynolds's use of logarithmic numbers is apparent. The latter two-thirds of upper layer (labeled 'FLS') is characterized by section lengths of 3, 5, 8 and 22 seconds (several sections are labeled with these integers, though when labels are not present counting the minor units of the graph paper reveals that surrounding sections are characterized by similar durations). These four durations are clearly drawn from the middle of Series 3 (omitting the value 13.5).¹² The lower 'CB&TBN' layer also derives its sectional divisions from this series. This layer begins with the duration 13.5, follows with twenty 3-second sections, and then expands with the following durations: 5, 8, 8, 13.5, 13.5, 22, and 36.5.

Examining these few sketches from *Again* helps facilitate an understanding of Reynolds's earliest experiments with logarithmic formal divisions. Shortly after composing this work, Reynolds codified his working methods, which he describes in *Form and Method*:

A series of numbers is established by laying a straight line across a sheet of semi-log graph paper. Such sheets are logarithmic along their vertical axis and linear along the horizontal one, thus it is possible to obtain a logarithmic series of numbers by reading the vertical Y-values at equidistant steps along the X-axis. A logarithmic series grows (or diminishes) in a non-linear way, thereby approximating, metaphorically, the effect of a musical ritard or acceleration.

The series, once determined, is used sequentially. The successive repetition of values is minimized since repetition suggests a static condition. As indicated above, I have come, rather, to feel that trended change is a more natural and engaging address to the perceptual system than constancy.

No permutation of order is allowed (that is to say, non-contiguous successions are avoided) for this could create the impression of arbitrariness, rather than necessary, coherent trends of growth or diminution.¹³

Formal Strategies in the 1980s

Reynolds spent a significant amount of time working at the French government's Institut de Recherche et Coordination Acoustique/Musique (IRCAM) facility in the early 1980s. Discussing the evolution of his approach to form during this time, he commented that '[a]t IRCAM the same sort of principles [as those employed in the 1970s] continued but they were used in a far more elaborate way'. *Archipelago* (1982–83, orchestra and computer-generated tape) perhaps represents Reynolds's most elaborate and complex realization of this idea. This work is characterized by thematic elements and their variants interwoven to create a 'mosaic of relationships ... [ultimately] pushing the logarithmic idea to its limits'. The design of this composition is well documented in the preface to its score, and discussed extensively by the composer in his writings.¹⁴

After *Archipelago*, Reynolds 'became interested in these algorithms, SPLITZ and SPRILZ which had the capacity to create patterns in time which were interesting but inscrutable ... a problematic and mysterious authority'. SPLITZ and SPIRLZ, discussed in the 'method' sections of *A Searcher's Path* and *Form and Method*, are two editorial algorithms employed by the composer that function to expand the time span of and vary existing material without the introduction of new pitches or

¹² The earlier part of the FLS layer features the durations 27, 11, 4.75, and 2. These values also relate logarithmically, but are not drawn from the sketch page discussed in this paper.

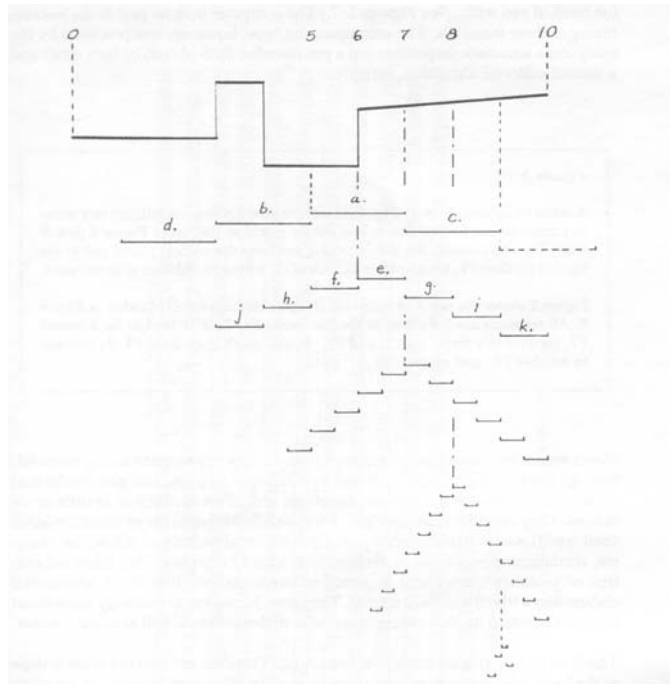
¹³ Reynolds 2002, 17.

¹⁴ See Reynolds 1987, 11–24 and 31–60, and Reynolds 2002, 22–24. *Archipelago* is recorded on 'Roger Reynolds: the Paris Pieces' (neuma Records 450–91, 1996).

motives.¹⁵ SPIRLZ and SPLITZ are the algorithms most often used by Reynolds and thus they are discussed with greatest detail in his writings. SPIRLZ, for example, involves the regular temporal subdivision of a section of music and the reordering of these derived subdivisions such that the central segment is heard first and the segments that follow emanate outward from the center. Example 6 reprints a graphic representation of this process from the composer's writings.¹⁶ The top of the diagram represents a hypothetical motive of four pitches of differing durations; time is represented horizontally while pitch is represented vertically (the final note is a gradual upward glissando). Regarding this diagram, the composer writes:

Time is measured across the page (0–10 seconds), and the melodic fragment to be treated is represented by horizontal line segments of varied length. Extracted segment *a* begins at the chosen 'mid-point,' 5 seconds. The final result of this process is a new line that presents, in unbroken succession, segments *a, b, c, d, e, f, g, h, i, j*, etc.¹⁷

This process can be repeated and realized by computer or by hand.



Example 6:
SPIRLZ diagram from
A Searcher's Path
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Reynolds commented that this manner of expansion 'seems orderly but not in an obvious way', creating a lively temporal character that is 'not rhythmic in a traditional sense'. He employed these algorithms as a localized technique that was used to expand material and fill larger logarithmic (formal) containers. This approach is seen in several works from the mid- to late-1980s including the *Transfigured Wind* series (1984–85, solo flute with varied performing forces), *Coconino ... a shattered landscape* (1985, string quartet), *Autumn Island (Islands from Archipelago: II)* (1986, solo marimba), *The Behavior of Mirrors* (1986, solo guitar), and *Variation* (1988, solo piano).¹⁸

¹⁵ See Reynolds 2002, 51–59 and Reynolds 1987, 12–20.

¹⁶ Reynolds 1987, 19.

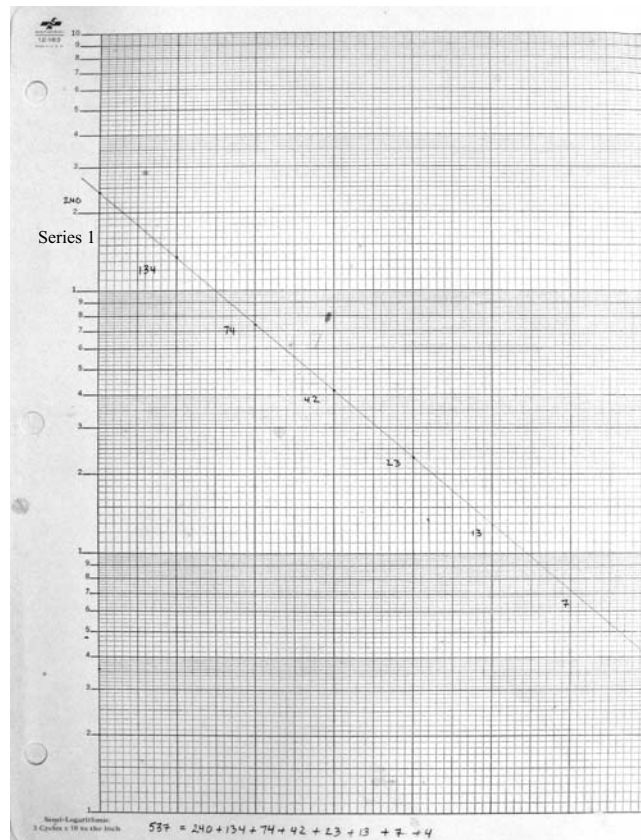
¹⁷ *Ibid.*, 18.

¹⁸ See Reynolds 1987, 61–65 and Reynolds 2006 for details relating to the creation of *Transfigured Wind*. Most of these works have been recorded on Montaigne, Bridge or Neuma Records.

This conception of form, larger logarithmically-related containers that are filled with material that is algorithmically expanded, is clearly demonstrated in the sketches from one of Reynolds's middle-period works, *Summer Island (Islands from Archipelago: I)* for solo oboe and quadraphonic sound (1984).¹⁹ Early in the composition of this work, Reynolds defined several numerical series using the semi-logarithmic paper described above (see Examples 7 and 8). Example 7 features a single series (4, 7, 13, 23, 42, 74, 134, 240) while Example 8 displays several (note that the vertical scale of each example differs – the first contains three vertical cycles from one through ten while the second spans only two, allowing greater precision). Figure 3 summarizes in ascending order the series found in these examples; I have labeled these series one through six in both examples and the figure below.

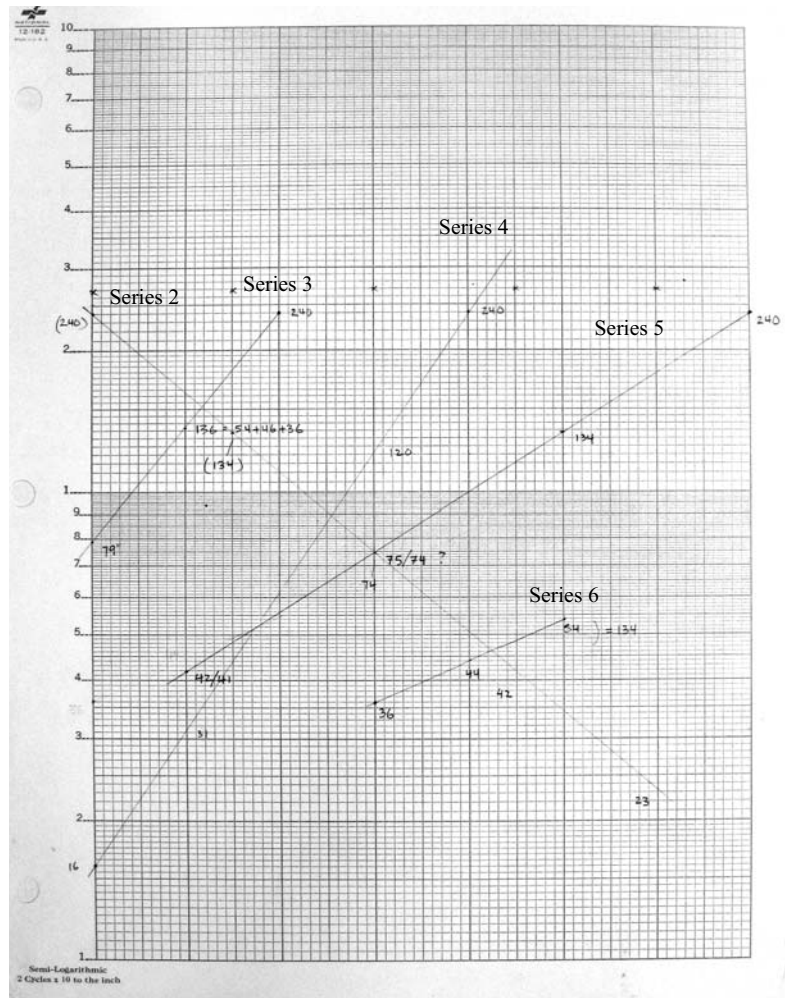
Figure 3

Series 1	4	7	13	23	42	74	134	240
Series 2	23	42	74	134	240			
Series 3	79	136 = 54+46+36(134)	240					
Series 4	16	31		120	240			
Series 5	42/41	75/74?	134	240				
Series 6	36	44	54					



Example 7:
Summer Island proportion graph 1

¹⁹ *Summer Island* is published by C.F. Peters Corporation (No. 67097R, 1984) and recorded by Jacqueline Leclair for NEUMA Records (NEUMA 450–91, 1996).



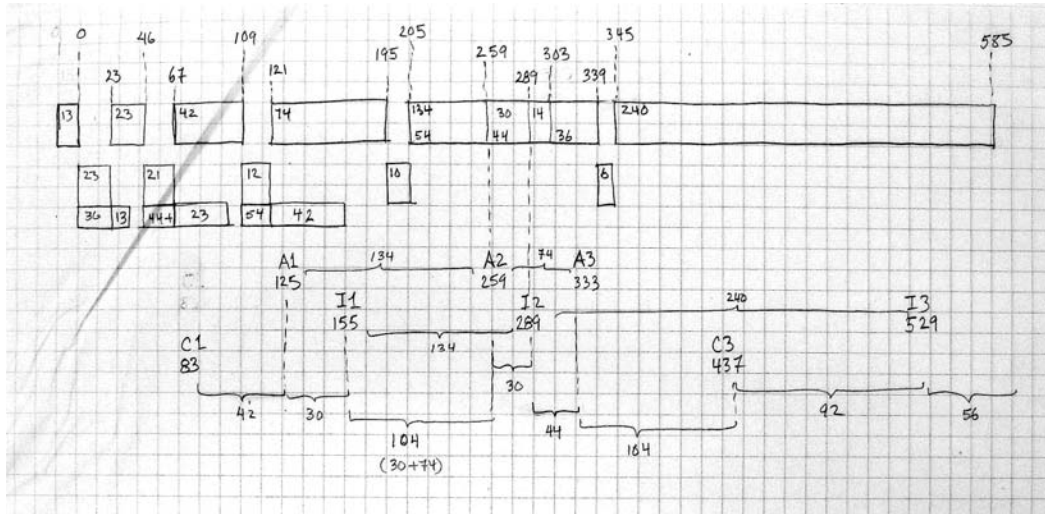
Example 8:
Summer Island proportion graph (2)

These series are interrelated in several ways. First, Series 2 and 5 are subsets of Series 1. Series 1 through 5 end with the value 240. Series 6 presents three values that add to equal 134, the penultimate value of Series 1, 2, and 5; a similar property is highlighted within Series 3.

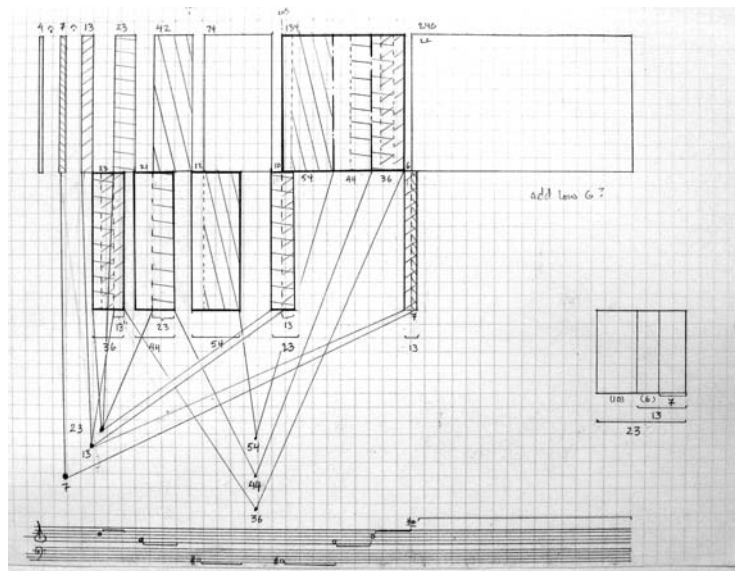
Reynolds translated this data into graphic proportion plans for *Summer Island* in a manner similar to that observed through the sketches for *Again* (see Examples 9 and 10). Each plan presents similar information; the latter plan (Example 10) is simply a more developed and visually refined version of the former (Example 9). Both plans feature two superimposed layers that translate loosely to the oboe (upper) and tape (lower). The durations that Reynolds used to create sections within the upper layer are drawn from the series found on Examples 8 and 9. The upper layer exactly replicates Series 1 while the lower layer uses Series 6 (36, 44, 54) and two members of Series 1 (13 and 23) that, when added, generate the first member of Series 6. It is notable that the silent spaces between the computer interludes are also drawn from the logarithmic series. Thus the series influences not only the duration of sections but also their placement.

Reynolds defined the work's principal proportional structure, the upper layer depicted in Examples 9 and 10, in isolation on Example 7. That series, here labeled Series 1, was then likely varied in several ways

on Example 8 where one finds five numerical series that incorporate and reflect portions of it. Some of these series were employed in the work as discussed above, and others were likely discarded.



Example 9:
Summer Island proportion plan, early



Example 10:
Summer Island proportion plan, later

The 1990s and Beyond

At the end of the 1980s and into the early 1990s, Reynolds began to look for sources of 'alternative proportional authority'. One area that began to interest the composer was chaos theory. He read popular books on the subject and found some of its graphic realizations (strange attractors) appealing, in particular the Hennon attractor that he used during the composition of *Odyssey* (1989–93, two singers, chamber ensemble, computer-processed sound, and lighting) and *Dionysus* (1990, chamber ensemble).²⁰ Reynolds traveled to a nuclear research center outside of

²⁰ See Reynolds 2002, 27–29 for a detailed discussion of *Dionysus*. *Odyssey* is recorded on 'Roger Reynolds: The Paris Pieces' (Neuma Records 450–91, 1996).

Paris, where he acquired a very large printout of this graphic, measured proportions within it and used them to guide formal decisions in the aforementioned works, though ultimately he felt that this approach 'didn't go anywhere'.²¹

In more recent compositions, Reynolds's approach to formal design has been more variable: some pieces are more loosely approached while others are tightly structured. *last things, I think, to think about* (1994, bass-baritone, piano and stereophonic computer-processed sound) is an example of the former tactic in which form is based the work's text, *Debit Night* by John Ashbery, rather than a 'large proposed structure'.²² Other works, such as *Submerged Memories* (2006, narrator, chamber ensemble, electroacoustic processing and visual projections), feature local proportionality but lack an overarching, global plan.²³ Thus, in more recent years, Reynolds's approach to form has been marked by changes in the degree to which that aspect is rigorously determined and traceable to a reference or source.

Thus despite the fact that Reynolds has employed logarithmic proportions for the majority of his career, it is clear that his approach to this 'central source of authority' has varied and changed over time. In a recent conversation I had with the composer, he outlined three primary approaches to using such a source. First, as seen in his early work, one can use a single proportion series strictly. Second, several series could be employed simultaneously, creating a feeling of formal waves, a concept perhaps best realized in *Archipelago*. Finally, a series could be placed in counterpoint with itself or other series so that the 'idea of a central source of authority rubbed against [something] or [is] dimensionalized in some way'. This third approach opens up many possibilities for striking, dynamic structures, and is reflected in a global sense in the flexibility with which Reynolds has approached formal design in his recent works. The formal design of *The Palace (Voicespace IV)* (1978–80, solo baritone and computer generated four-channel tape) is a fascinating example of this principle from the middle of Reynolds's career.

[To be continued]

Examples 1, 2 Copyright ©1961 by C.F. Peters Corporation. Used by Permission. All Rights Reserved.

Examples 3, 5, 7, 8, 9 and 10 Used by permission of the composer, and the Library of Congress Music Division.

[I would like to thank Roger Reynolds, Thomas DeLio, Stephen Lilly and Benjamin Levy for their insightful comments on this article, the Music Division at the Library of Congress, particularly Stephen Soderberg, for their assistance with my research, and Joseph Auner for sparking my interest in sketch studies.]

²¹ See Reynolds 2002 (Part II), 16 for a reproduction of this diagram and demonstration of its use.

²² This work is discussed in Levy 2004 and recorded on Electronic Music Foundation EM144 (2002).

²³ Bithell 2007, an extended interview with Reynolds, discusses formal elements of two works from the same period: *The Image Machine* (2005, real-time interactive computer music) and *ILLUSION* (2006, singers, actors, instrumental ensemble, and computer-processed and spatialized sound).



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