Ring
for orchestra and antiphonal women’s choir

by

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THESIS ABSTRACT

Ring is a composition for orchestra (piccolo [doubling flute], two flutes, two oboes, English horn, two clarinets in B-flat, bass clarinet, two bassoons, contra-bassoon, four horns, four trumpets, two tenor trombones, bass trombone, tuba, three percussion parts [including glockenspiel, vibraphone, tubular bells, snare drum, toms, bass drum, suspended cymbal, drum kit, triangle, and gong], timpani, harp, piano, and standard strings) and spatially separated women’s choir (SA right, SA left). This arrangement of media is intended to “ring” the audience with performers. At the notated tempo of two quarter-notes per second, the duration of the piece is exactly 17'40”.

The title of Ring comes from a poem of the same name written by the composer which is the principal text sung by the choir in the piece. The text of the poem is as follows: Wendy is a ring / A beginning and an end / Connected / The finest gold / Melted by touch / Cooled by breath / She fits my every finger / Without constraint / But permanent / Priceless, Precious, Beautiful / Alone / She clothes me. The poem and composition were written for, and dedicated to, the composer’s wife.

The ring metaphor (“ring” meaning cyclical, unending, complete) underlies many of the compositional choices in the work. Much of the surface of the music and its deeper structural elements are palindromes, which, because they end as they begin, have a circular nature. Also, the pitch structure of the piece involves the climactic completion of the “cycle” of the twelve available equal-tempered pitch classes. A further organizational element is the Fibonacci series, a mathematical construct which is used to determine small-scale rhythms and the duration of the larger sections of the work.
These components, taken together, have resulted in a composition filled with variety and contrasts, which, nonetheless, is quite organically cohesive.
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INTRODUCTION

*Ring* is a single-movement composition for an orchestra consisting of two of each woodwind, piccolo, English horn, bass clarinet, contra-bassoon, four horns, four trumpets, three trombones (including bass trombone), tuba, percussion, harp, piano, strings, and antiphonal (stereophonic) women’s choir (SA right, SA left). The text is a poem, also entitled *Ring*, written by the composer. On the surface, *Ring* is a composition the primary activity of which is the controlled unfolding of the total chromatic over a pedal-tone expressed in the context of a highly melodic compositional style. At a deeper level, the contents of *Ring* -- from the pitch-class [pc] organization just described, to the relationship of large segments of the work to one another, to elements as small as two and three note pitch and rhythm motives -- all combine to amplify and illuminate the various meanings of the text in general and the word “ring” specifically.

The word “ring” has numerous definitions. *Webster’s New Collegiate Dictionary* lists no less than 46 separate definitions of the word that can act as a noun or a verb in at least two distinctly different ways in each case. Because this word is the title of the piece under discussion and because these multiple meanings were carefully considered during the work’s composition, a partial list of those definitions is appropriate here:

1. **ring n** 1: a circular band for holding, connecting, hanging, pulling, packing or sealing 2: a circlet usually of precious metal worn on the finger 3 a: a circular line, figure, or object b: an encircling arrangement . . . 7: an exclusive combination of persons.
2. **ring vt** 1: to place or form a ring around 2: to provide with a ring . . . vi . . . 2: to form or take the shape of a ring
3. **ring vi** 1: to sound resonantly or sonorously 2 a: to be filled with a reverberating sound . . . 3: to cause something to ring . . . 4 c: to sound repetitiously 5: to have a sound or character expressive of some quality
...\( \text{vt} \) 1 : to cause to sound especially by striking 2 : to make (a sound) by or as if by ringing a bell 3 : to announce by or as if by ringing 4 : to repeat often, loudly, or earnestly. . .
\textit{ring} \textit{n} 1 : a set of bells 2 : a clear resonant sound made by or resembling that made by vibrating metal 3 : resonant tone 4 : a loud sound continued, repeated, or reverberated 5 : a sound or character expressive of some particular quality 6 a : the act or an instance of ringing. . .(998)

The excerpt above shows 22 discrete meanings for the word "ring," which is less than half the total meanings published in the cited text. Such multiplicity of meaning is roughly analogous to the ambiguous, non-referential meaning of a tone or group of tones. Even in a tonal setting, where functionality provides a basis for ascribing the tonal label, a given pc or group of pcs can be heard to function in a variety of ways. For example in a diatonic environment, scale degree 5 may be heard as belonging to either tonic or dominant harmony, or as a mild dissonance against subdominant harmony. This simple example points out one way in which the meaning of pitch and the meaning of words are similar. In both cases, meaning (read \textit{function} in the case of pitch) is highly dependent upon context. Contextual determination of function is central to the underlying pitch structure of Ring. Further, context plays an important role in the meaning of the words in the text and of the phonemes sung by the choir in some sections of the piece.

Now this discussion must be put into its proper context by 1) setting forth the text in its entirety and clarifying its relationship to the composition as a whole and 2) delineating the underlying pitch structure of Ring and providing examples of possible contextual interpretations. These two topics lead inexorably to 3) a discussion of the form of the work which contains organizational principles that influence the structure of both large and small formal units, and further reinforce the music's relationship to the text, drawing us back to the beginning of our discourse. Clearly even the discussion of Ring must be circular.
THE TEXT

The text is a poem composed in free verse and contains multiple levels of meaning -- both literal and figurative. These meanings and their relationship to the music are best described after a careful reading of the complete poem:

Wendy is a ring
A beginning and an end
Connected

The finest gold
Melted by touch
Cooled by breath

She fits my every finger
Without constraint
But permanent

Priceless, Precious, Beautiful

Alone

She clothes me

The poem is arranged in three stanzas of three lines each followed by three isolated lines. The lines vary in their number of syllables from two to seven. The first stanza states the subject of the poem clearly, with the remaining lines providing amplification. The central image, as previously mentioned, is that of a woman, “Wendy,” being metaphorically equated with a ring. That “Wendy” and “a ring” are the same is depicted in the setting of the text by the constant pairing of those words set to a recurrent motive (see figure 1).
The phrase "A beginning and an end/Connected" refers to the circular nature of a ring, but it is also a time reference implying eternity (no discernible beginning or ending) which is represented musically by long static sections. The phrase is also indicative of a journey or quest which, since the beginning and ending are connected, is both initiated and satisfied at once.

In the music, the circular nature of the ring image is expressed as palindromes. One such palindrome involves the duration of the sections of the piece which, when they are delineated by pc content, form one large palindrome encompassing the entire work. There are also smaller scale palindromes such as in the percussion and piano mm. 621-637, and the contra-bassoon mm. 18-22ff. Even the persistent neighbor motion G-A-G that forms the basis of the first thematic material at m. 11 is a simple palindrome (see figures 2A-C).
The next two stanzas continue to describe the ring/woman, highlighting particular qualities and beginning to make references to the speaker’s relationship to his subject. On the literal level, these stanzas describe the ring’s composition (“The finest gold”) and its function (“She fits my every finger”). Beyond this literal interpretation, however, is sexual imagery — “Melted by touch/Cooled by breath.” The setting of the text underscores this meaning, especially in mm. 584-89, where the reiteration of the word “Wendy” occurs juxtaposed with the word “touch” (see figure 3).
* Close to final consonant and hiss for notated duration.
** Elide final "th" of "breath" with the beginning "th" of "the."
*** Whisper loudly the word "touch," rhythm ad lib. Each player should proceed at his/her own pace without synchronizing sections.
The meaning of the text in these stanzas is further enhanced by text-painting. This occurs in mm. 581-584 when the word “Melted” is set to a vocal glissando. Here the C-sharp “melts” into the D-sharp and back (another palindrome). This motive is echoed by string glissandi and by the oboes using lip bends. Similarly, the word “breath” is depicted by the choir hissing the “th” phoneme and the brass players blowing air through their instruments (see figure 3).

The next section of the text consists of three individual lines. These lines continue the process of describing the subject and referring to the subject’s relationship to the speaker of the poem, but the lines have another important function as well. The first three stanzas have a tendency to objectify “Wendy.” She is a ring, a beautiful object, an adornment. The lines “Priceless, Precious, Beautiful/Alone” counteract this notion by pointing out her intrinsic value. Her value is not due solely to the pleasure and satisfaction she gives to the speaker. Her attributes are praiseworthy unto themselves even in the absence of the speaker -- when she is “Alone.” Because this section of the text is so important to the overall meaning of the poem, these lines receive special musical treatment. The line “Priceless, Precious, Beautiful” is repeated in the context of a rapid textural crescendo. The rhythm employed is one foreshadowed by the brass section numerous times earlier in the piece; that of combining duple and triplet eighth-notes. This repetition is an example of one of the definitions of “ring” cited above, “ring vt 4 : to repeat often, loudly, or earnestly.”

After the words “Wendy” and “ring,” the word “alone” is the most important single word in the poem. When it appears for the first time, it is set with obvious text-painting for unaccompanied choir. Subsequently it is repeated “clothed” with orchestral doubling. These two disparate settings underline an
important function of the word "alone." "Alone" is the end of the idea that began with "Priceless, Precious, Beautiful" and the beginning of the idea that concludes with "She clothes me." "Alone" serves as an elided connection between the two ideas, the first of which points out Wendy's inherent, objective value and the second of which describes her value to the speaker. This single word serving as an end of one idea and a beginning of another hearkens back to the first stanza of the poem "A beginning and an end/Connected," and therefore implies palindromic structure in the poem as well. The setting of the text reinforces this interpretation by restating the first line of the poem, "Wendy is a ring," at the end of the entire piece.

The exposition of the text in a syntactically comprehensible form occurs in the latter half of the composition. This does not mean, however, that the choir remains tacet for the remainder of the piece. The choir participates at the beginning of the piece, mm. 1-84, and at mm. 400-437. At these moments, the choir's major function is to provide timbral variety to the orchestra. In other words, the voices are being used as additional instruments in much the same way as Debussy uses the women's choir in "Sirénes" from Nocturnes. The syllables sung on these occasions are not intended to be understood by the audience as words, but they are, in fact, the slowed-down, component phonemes of the words "Wendy" (/u/ /en/ /dl/) and, in mm. 400-437, "Are You Ready" (/a/ /Ri/ /ju/ /Re/ /dl/) [Are You Ready is the title of a song composed by the author and performed at his wedding in 1983, the melody of which is quoted in these measures also].
THE PITCH-CLASS STRUCTURE

The pitch-class structure of *Ring* revolves around a methodical presentation of the total chromatic. All twelve pcs do not appear simultaneously, or even in the same section as one another, until the final measures of the piece. This means that in the course of the piece there is a general increase in pc variety, although this increase does not slope uninterruptedly upward from the beginning of the piece to the end. At a climactic point after the temporal center of the piece, the number of pcs present recedes, only to rise again to its apex at the conclusion of the work. The order and pacing of the introduction of additional pcs throughout the course of the work is not random, however. The pc content of any given moment in the piece is dictated by a pre-compositional pc segmentation plan, the details of which are described below.

Around any given pc, the remaining eleven pcs can be arranged symmetrically as chromatic scales proceeding away from the given pc in contrary motion. Beginning from this point, it is then possible to segment those eleven pcs into five dyads inversionally symmetrical around the given pc. These dyads encircle or “ring” the given pc. The remaining pc, with an interval-class [ic] 6 relationship to the given pc, is itself inversionally symmetric around the given pc (see figure 4).
The pre-compositional segmentation of the total chromatic that is the basis of *Ring* uses this dyadic structure as a starting point. The way these dyads are organized, though, relies on assumptions about the way pitches and pcs relate to one another and the nature of consonance and dissonance and the effect of each on the relative level of tension in a piece of music. One such assumption is that dissonance is an objective and quantifiable parameter in music and that different intervallic combinations contain different levels of dissonance. A further assumption is that a higher level of dissonance can result in greater musical tension and that it is the relationship between tension and relaxation that gives shape to goal-oriented music. Although many versions of an interval-class consonance/dissonance spectrum are possible, in *Ring*, the following spectrum was assumed (from most consonant to most dissonant):

<table>
<thead>
<tr>
<th>consonant</th>
<th>dissonant</th>
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<tbody>
<tr>
<td>ic5</td>
<td>ic4</td>
</tr>
<tr>
<td>ic3</td>
<td>ic2</td>
</tr>
<tr>
<td>ic6</td>
<td>ic1</td>
</tr>
</tbody>
</table>
Another assumption is that, given a Western listener's familiarity with functional tonality as an idiom, if tonal associations among pitches or pcs can be perceived they will be perceived and that these associations can be used to establish a sense of inevitability in a continuum of tonal relationships.

In *Ring*, the given pc that functions as the organizational center of the pc structure is D. For this reason, let D = pc 0. With the intent of increasing the tension until the climax of the piece, the dyads ringing pc 0 are introduced one at a time in order of increasing total dissonance (see figure 5).

**Figure 5 -- pc sets in *Ring* mm. 1-477**

<table>
<thead>
<tr>
<th>Set</th>
<th>mm.</th>
<th>Pcs</th>
<th>Dyad Added</th>
</tr>
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<tbody>
<tr>
<td>A</td>
<td>11-20, 80-132</td>
<td>ic5 dyad added</td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>21-40, 133-332</td>
<td>ic3 dyad added</td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>1-5, 42-79, 333-477</td>
<td>ic4 dyad added</td>
<td></td>
</tr>
<tr>
<td>D</td>
<td>1-5 intermittently thereafter</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note that in the assumed dissonance spectrum above, ic4 is considered more consonant than ic3, yet the ic3 dyad (3,9) is introduced in the piece earlier than the ic4 dyad (4,8). This choice is made because the total intervallic content of the resulting set must be considered, not just the consonant/dissonant relationship to pc 0. The interval vectors in figure 5 show that sets a and b are devoid of ic1, the most dissonant interval in the spectrum. Had the ic4 dyad been introduced before the ic3 dyad, the pentachord (0,4,5,7,8) would have resulted with the interval vector <2,1,2,1,2,0> which, of course, contains ic1 and is more dissonant than set b. It is also important to notice the complete absence of pcs 1 and 11, which form ic1 intervals with pc 0. These pcs are reserved for a climactic point in the composition.
Set d of figure 5 does not have the same sort of consistent, linear exposition that sets a, b, and c have. Set d appears in the first five measures and periodically thereafter. Its function in the pc structure is to provide tonal variety. The pcs of set d (2,6,10) are not used more often because they form ic2 and ic6 dissonances with pc 0. For this reason, the appearance of set d demarcates important rhythmic and temporal units of the work.

The pc structure of the remaining portion of *Ring*, mm. 478-709 may seem unrelated to that of the previous portion. Although it is true that the pc structure of the concluding section is more intuitively conceived, careful examination reveals strong relationships between the pc structure of the beginning and the conclusion, leading to the perception of one coherent whole.

The pcs in use in mm. 478-639 form the pentachord (1,4,6,7,11). Let us call this pc set e. Note that set e contains pcs 1 and 11. Therefore, at m. 478 the total chromatic is completed. The interval vector of set e is $<1,2,1,1,3,1>$. Compare this interval vector with that of set b, $<0,3,2,2,2,1>$, and we can see that 60% of the intervals in each pentachord are the same. A quick way to see this similarity in notation is to arrange both pentachords as half-diminished seventh chords with an extra note (see figure 6).

**Figure 6 -- re-arrangement of sets a and e**

![Figure 6](image_url)

The “extra note” of set e is pc 6. This pc is an important link between the pc structure of the first 477 measures and the last 232 measures. Figure 7 shows the nature of this link.
When sets a and d are transposed by ic6 a reversal of the consonant/dissonant relationship of each pc relative to pc 0 occurs. Under this transposition pc 0 becomes pc 6, which, along with pcs 1 and 11 (previously withheld due to their dissonant relationship with pc 0) now form the transposed version of set a (1,6,11). This trichord, then, is itself a subset of set e (1,4,6,7,11). The other two pcs of set e are members of set c (or set d transposed) (0,3,4,5,7,8,9) and set a (7,0,5) and serve as common-tone links with the previous section.

The pc structure of mm. 478ff does not preserve the same rigorous symmetry that exists in the first 477 bars. In this sense the structure of the concluding section is more ‘intuitive,’ which is appropriate for the intensely personal, even romantic text that appears there. Following the arrival point at m. 478, the pc structure of Ring involves the gradual reintroduction of the remaining seven pcs. These pcs are not introduced as dyads symmetrically arranged around a central pc, however. At m. 640, when the word “alone” first appears, the trichord (3,9,10) is added. At m. 667, the dyad (2,8) is added. The last
two pcs are added one at a time, first pc 5 at m. 689, and finally pc 0 at m. 700, completing the total chromatic once again.

Although the return of pc 0 at the end of the piece implies a return to the origins of the piece, making yet another reference to the ring metaphor, the order of the reintroduced pcs is not as important as the number of pcs introduced each time and the temporal location of the addition of those pcs. The pattern 3,2,1,1 (a trichord, followed by a dyad, followed by two individual pcs) is part of the Fibonacci series, a mathematical sequence upon which the form of Ring is heavily dependent.

Before moving on to a discussion of form, however, some basic questions should be answered that will shed light on the ways in which the above outlined pc structure is actually used in the composition. Why, for example, is pc D (0) the pc around which the piece is organized? One reason for this choice has to do with the title of the piece and the tuning of string instruments. Numerous moments in the first 477 measures of Ring call for playing on open strings (mm. 1-5, 20-44, 50-57, 64-84, 244-254, and many others). The unstopped strings will “ring” more freely. All four string instrument types can play all the pcs of set a (0,5,7) on open strings. Further, those open strings may vibrate sympathetically when other instruments play those pcs, giving the entire orchestra a more resonant “ring.” That pc 0 is central to the pc organization, is also made obvious by the way it is used. Pc 0 appears as the pedal tone beginning in m. 1 and continuing until m. 477. The term “pedal tone” is used loosely here, as pc 0 is not always in the lowest voice nor always expressed as a sustained tone, but simply constantly present. At times the presence of pc 0 is emphasized, creating an effect much like that of a pedal tone in common-practice music. At other times it is merely a consistent part of the texture.
Finally, something must be said about the implication of functional tonality in some sections of *Ring* (during this discussion pc letter names will substitute for numbers in order to make tonal relationships more readily apparent). The presence of the sustained D pedal indicates that some sort of pitch centrism is taking place, focusing on D itself or possibly on G, if D is heard as the dominant. However, it would be difficult to imply tonal function with a trichord (set a) or even a pentachord (set b). Only when the number of pcs reaches seven (set c) can functionality be readily implied.

Though the pcs of set c are not a diatonic collection, when certain pcs are stressed through duration, repetition, metric accent, or registral placement, and others are inversely de-emphasized, the pcs of set c can imply tonal function in several different key areas. The assumption was made that the tonic and dominant note (*do* and *sol*) and at least one tendency tone (either *fa* or *ti*) must be present in order to adequately imply functionality (see figure 8).

**Figure 8** -- set c as source material for implied key areas mm. 333-477

\[= \text{pcs emphasized} \quad \circ = \text{pcs de-emphasized}\]

\[b \text{ minor mm. 333-356} \quad G \text{ major mm. 356-370} \quad d \text{ minor mm. 370-399}\]

whole-tone emphasis (set d included) mm. 399-413

\[\text{temporal center of piece}\]

\[B-\text{flat major mm. 451-477} \quad g \text{ minor mm. 437-451} \quad D \text{ major mm. 413-437}\]
The most important of these implied tonal areas occurs beginning in mm. 451. Here B-flat functions as the implied tonic, accomplished by the suppression of the B-natural and F-sharp of set c and the metrical and registral emphasis of the pcs of a B-flat major triad. The tonicization of B-flat is intended to make the eventual arrival on the E-flat bass note at m. 478 sound more inevitable (remembering the previously-stated assumption concerning the listener’s likely ability to hear functional relationships due to a familiarity with the tonal system). Tonal function is further invoked in mm. 470-77 where, with the inclusion of set d (A-flat, C, E), pc D is inflected as a tendency tone in the tritonally related keys of E-flat (D = ti) and A (D = fa) through the use of repeated scale passages. This momentary bitonality pushes the voice-leading toward E-flat (do) and C-sharp (mi) respectively (pcs 1 and 11 in the earlier numbering system). When these pcs arrive the total chromatic is finally completed (see figure 9).

Figure 9 -- tendency tone resolution to pcs 1 and 11

```
re  do  ti  la  sol  fa  mi
re  me  fa  sol  le  ti  do
```
THE FORM

If a discussion of the pc structure delineates the materials of *Ring*, then a discussion of the form describes the organization of those materials. Organization in music can take different forms. Total serialization is not the only method of creating highly organized music. One could argue that a Bach fugue is just as highly organized, and that the economy of material inherent in that organization is more easily perceived by a listener than the organization of Boulez' *Structures*. Total serialization can organize most, or perhaps all, of the parameters of a piece of music, but does that organization operate at multiple levels? In other words, does the organization scheme control elements of the surface, the middle-ground, and the background in similar ways, as in some works from the classical period where the structure of a two-beat measure is similar to the structure of the two-measure phrase segment of which it is a component? The phrase segment may then resemble an entire four-measure phrase which is itself half of an eight-measure period. In a binary piece or movement, this structural hierarchy could echo from the surface of a single measure to larger and larger formal units all the way out to the structure of the entire movement.

In spite of the fairly restrictive pc structure outlined in the previous section of this paper, but in keeping with its moments of implied tonality, the organization of *Ring* has more in common with the hypothetical classical example above than it does with the Boulez, because the organizational principles employed in *Ring* do operate in both the foreground and the background. The organizational principles that deserve the most attention in this regard are palindrome and the Fibonacci series.
That a palindrome is a circular or cyclical idea is an important underlying assumption in Ring. Anything that ends as it begins has the potential to begin the process again and again, \textit{ad infinitum}. Such an arrangement is undeniably circular. The challenge inherent in composing a goal-oriented piece of music in the form of a perfect palindrome is that this tends to force the goal of the piece into the center, where the only unique moment can occur. A popular verbal palindrome will help demonstrate this. In the sentence, “Madam I'm Adam,” each letter appears twice except the “I” which is in the exact center of the palindrome. In a longer piece of music (the duration of \textit{Ring} is 17’40” at the notated tempo), the climax of the piece would come with half of the piece yet to play. Such a form presents a very difficult compositional problem: how to sustain energy and interest when all that remains is a reversed repetition of the first half of the piece. Two possible solutions to this problem are to use a modified palindrome or embed the palindrome far enough below the surface of the music that it can remain true and yet allow the music to climax at a point other than the temporal center of the piece. \textit{Ring} takes advantage of the latter solution.

The question then remains, if not the center of the piece, then where should the climax be placed? Composers often make this decision intuitively. But whether by intuition or design, a common location for a goal in goal-oriented music is the so-called “golden section.” The golden section is a point \( M \) in the course of a span \( AB \) (this could be a line or a time span) such that the ratio of the two parts, the smaller to the larger (AM and MB), is the same as the ratio of the larger part to the whole \( AB \) (Knott, “Fibonacci Numbers and the Golden Section in Art, Architecture and Music”). One way to determine point \( M \) is the use of the Fibonacci series. The Fibonacci series is a sequence of numbers in
which the next number in the sequence is equal to the sum of the immediately preceding two numbers. For example, the Fibonacci series beginning with 0 and 1 would be: 0, 1, 1, 2, 3, 5, 8, 13, 21, 34, 55, and so on. As this sequence progresses (after 21 in the sequence), a consistent ratio emerges 1:1.618 (Phi). This ratio, applied to the lengths of the sides of a rectangle, produces a “golden rectangle,” such as those found in the design of the Parthenon in Athens (Knott). These proportions have also been found in Béla Bartók’s formal and harmonic structures (Lendvai). Claude Debussy, too, appears to have been conscious of the value of these proportions (Howat).

With the use of both palindrome and Fibonacci thus justified, how, specifically, do these ideas shape the form of Ring? Both elements operate on multiple levels in the piece and touch on numerous musical parameters such as sectional duration, rhythmic duration, pc structure, and orchestration. For the sake of clarity, let us work from large to small and consider the proportions of the larger formal units first.

Ring can be bifurcated between mm. 477-8, creating two large but unequal parts, A and B. This point is close to, but not exactly, the arithmetic golden mean. The justification for this division hinges on the pc content of the two sections (sets a-d in A and set e + additions in B) and on the previously mentioned pedal on pc 0. The cessation of pc 0, occurring at m. 478, clearly heralds the start of a new section of the piece (see figure 10).
Figure 10 -- formal bifurcation of Ring

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
</tr>
</thead>
<tbody>
<tr>
<td>mm. 1-477</td>
<td>mm. 478-709</td>
</tr>
<tr>
<td>contains all pcs except 1 and 11 in the presence of a pedal on pc 0</td>
<td>begins with set e which includes pcs 1 and 11, excludes pc 0</td>
</tr>
<tr>
<td>660 seconds long</td>
<td>400 seconds long</td>
</tr>
<tr>
<td>1320 quarter-notes at quarter = 120</td>
<td>800 quarter-notes at quarter = 120</td>
</tr>
</tbody>
</table>

In order for section B to begin at precisely the golden section, it would have to be 408 (actually 407.9) rather than 400 seconds long, a difference of eight seconds. If it is true that golden section divisions produce pleasing proportions, it is nevertheless unlikely that a difference of eight seconds would be audibly perceptible in a work lasting 1060 seconds. Further, this discrepancy can be justified, as it results from the inclusion of both palindromic and Fibonacci proportions.

In order to see these interacting proportions, we must divide Ring into still smaller sections. Such segmentation can be done easily on the basis of pc and thematic content. Figure 11 shows the sub-sections of A along with the pc content, duration in quarter notes, and major thematic material of each.
Figure 11 -- subsections of A

<table>
<thead>
<tr>
<th>subsections</th>
<th>measure range</th>
<th>pc content</th>
<th>quarter-note duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>a1</td>
<td>1-10</td>
<td>all except (1, 11)</td>
<td>40</td>
</tr>
<tr>
<td>principle thematic material</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a2</td>
<td>11-20</td>
<td>set a (0,5,7)</td>
<td>40</td>
</tr>
<tr>
<td>principle thematic material</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a3</td>
<td>21-40</td>
<td>set b (0,3,5,7,9)</td>
<td>80</td>
</tr>
<tr>
<td>principle thematic material consists of a6 material in augmentation (x4)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a4</td>
<td>41-79</td>
<td>sets c and d (0,3,4,5,7,8,9) (2,6,10)</td>
<td>120</td>
</tr>
<tr>
<td>principle thematic material (abbr.)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a5</td>
<td>80-132</td>
<td>set a</td>
<td>200</td>
</tr>
<tr>
<td>principle thematic material consists of a3 material in augmentation (see figure 14)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a6</td>
<td>133-332</td>
<td>set b</td>
<td>320</td>
</tr>
<tr>
<td>principle thematic material (abbr.)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a7</td>
<td>333-477</td>
<td>set c and d</td>
<td>520</td>
</tr>
</tbody>
</table>

thematic material consists of elements of all previous sub-sections
Although the measure numbers lose consistency due to changing meter, we can see by the number of quarter-notes per sub-section that the duration of the sub-sections of A relate to one another in Fibonacci proportions (divide the number of quarter-notes in each sub-section by 40 to get the original Fibonacci sequence 1,1,2,3,5,8,13...). It is also apparent that sub-sections a2-4 have the same pc content and similar thematic content as sub-sections a5-7, making a2-4 a smaller version or microcosm of a5-7.

Sub-section a1 contains all the pcs that appear in A. From a pc standpoint and for a number of other reasons, then, a1 is a microcosm of all of A. The ten-measure duration of a1 is the durational basis for all the sub-sections of A; the pc 0 pedal that sustains through the entire duration of A begins in a1; and the rhythm of the fierce chords of mm. 1-5 are in reversed Fibonacci order beginning with a duration of 8 quarter-notes.

The discussion of sub-section a1 returns to a point introduced above about levels of formal organization; what has been herein called structural hierarchy. This means that organizational principles applied at the local level pertain to ever larger formal units. Additional examples of such relationships will appear at various times in the continuation of this section on form and again in the concluding section of this paper. First, however, we must sub-divide section B to uncover Ring's hidden palindrome.

Section B is also best segmented by pc content, since that content changes so rarely. Figure 12 shows the measure range, duration in quarter-notes, and pc content of the sub-sections of B.
Figure 12 — subsections of B

<table>
<thead>
<tr>
<th>subsections</th>
<th>measure range</th>
<th>pc content</th>
<th>quarter-note duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>b1</td>
<td>699-709</td>
<td>total chromatic</td>
<td>40</td>
</tr>
<tr>
<td>b2</td>
<td>689-699</td>
<td>set e, plus (2,3,5,8,9,10)</td>
<td>40</td>
</tr>
<tr>
<td>b3</td>
<td>667-689</td>
<td>set e, plus (2,3,8,9,10)</td>
<td>80</td>
</tr>
<tr>
<td>b4</td>
<td>640-667</td>
<td>set e, plus (3,9,10)</td>
<td>120</td>
</tr>
<tr>
<td>b5</td>
<td>580-640</td>
<td>set e</td>
<td>200</td>
</tr>
<tr>
<td>b6</td>
<td>447-580</td>
<td>set e</td>
<td>320</td>
</tr>
</tbody>
</table>

Justification for the segmentation of mm. 478-639 at m. 580, even though there is no pc change, consists of the rhythmic and textural crescendo in the measures leading up to m. 580, the arrival of the soprano on a sustained A5 on “gold,” (an important moment in the text), the sudden cessation of the almost-constant eighth-note surface rhythm, and the introduction of an entirely new texture which follows immediately. Notice that the duration of sub-sections b1-6 are the same as those of sub-sections a1-6. These equivalent sectional durations, expanding outward from the center (a7), form a palindrome encompassing the entire composition. Superimpose this palindrome on the Fibonacci proportions previously discussed and the hybrid form of Ring is apparent (see figure 13).

Figure 13 — palindrome/Fibonacci complex

<table>
<thead>
<tr>
<th>Subsections</th>
<th>a1</th>
<th>a2</th>
<th>a3</th>
<th>a4</th>
<th>a5</th>
<th>a6</th>
<th>a7</th>
<th>b6</th>
<th>b5</th>
<th>b4</th>
<th>b3</th>
<th>b2</th>
<th>b1</th>
</tr>
</thead>
<tbody>
<tr>
<td>x=40 js</td>
<td>x</td>
<td>x</td>
<td>2x</td>
<td>3x</td>
<td>5x</td>
<td>8x</td>
<td>13x</td>
<td>8x</td>
<td>5x</td>
<td>3x</td>
<td>2x</td>
<td>x</td>
<td></td>
</tr>
</tbody>
</table>

Sum of section B = 20x
The last sub-section of A, a7, is 13x (520 J s). The next duration in the Fibonacci sequence would be 21x. Section B, however, is 20x in duration, a difference of merely x. This difference is a by-product of combining the Fibonacci and palindrome forms.

The assertion has been made that structural hierarchy is at work in *Ring*, meaning that small-scale elements contain the same or similar formal characteristics as large-scale elements. Some examples of this activity have already been presented. These include the smaller palindromes mentioned above in the section about the text (figure 2) and the discussion of the sub-sections of A (figure 11). Additional examples are required, however, in order to touch on topics that heretofore have received little attention. In the course of discussing one such topic, orchestration, other salient points will be raised regarding rhythm, melodic structure and the formal organization of smaller sections.

The orchestration of *Ring* tends to support the above-outlined sectional segmentation. This is particularly noticeable in section A. Sub-section a1 introduces the idea of tutti chords in a rhythmic expression of the Fibonacci series. This idea occurs in several sections of the piece and tends to coincide with sectional demarcation. A good example of this would be sub-section a3 (mm. 41-79) where the idea is extended beyond the Fibonacci number 8 (m. 46) to 13 (m. 50), 21 (m. 57), and back to 13 (implying a palindrome) before starting again with 1 at m. 64. This time the palindromic organization of the chords is not implied but fulfilled, culminating in the arrival of sub-section a4. These tutti chords, as the phrase suggests, involve all sections of the orchestra.

Other motivic ideas, these based on the pc segmentation of the piece, are dominated by certain sections of the orchestra. The sustained neighbor motive
that is the primary thematic material of sub-sections a2 and a4, is stated mainly by the brass section. This idea, as mentioned previously, is a pitch palindrome. Its rhythm, however, involves Fibonacci durations (see figure 14).

**Figure 14 -- examples of Fibonacci diminution**

mm. 11-20

Hrn. 1

\[ \begin{array}{c}
3 \downarrow s \\
2 \downarrow s \\
1 \downarrow \\
1 \downarrow 
\end{array} \]

mm. 85-99

Hrns. Trbs.

\[ \begin{array}{c}
8 \downarrow s \\
5 \downarrow s \\
3 \downarrow s 
\end{array} \]

The melody of sub-sections a3 and a6 is scored principally for woodwinds, although this is obscured by its presentation in augmentation and trills in the flutes and clarinets in a3. This melody also contains expressions of both palindromes and Fibonacci numbers (see figure 15).

**Figure 15 -- palindrome and Fibonacci relationships in a3/a6 melody**
The interval classes of the opening four-note motive, though not in Fibonacci order, are all Fibonacci numbers (ic2, ic5, and ic3). Also, note the palindromes highlighted in figure 15. Both are rhythmic palindromes, but the first example is also a pitch palindrome (with one aberrant pitch).

The melodic material of sub-sections a4 and a7 is given primarily to the strings. These sub-sections, because they are constructed out of the largest pc set (set c containing seven pcs), and because set d intermittently participates making a pc palette of ten pcs, have the greatest degree of variation within a given sub-section. These sub-sections are also longer in duration. Taken together, these features make a4 and a7 harder to characterize in a paragraph. One element that can be generalized, though, is the inclusion in these sub-sections of either implied or clearly stated tonal goals. In fact, implied key areas form another palindromic structure in a7. We have already discussed the B-flat major area that occurs in mm. 451-477, with a duration of 87 quarter-notes. An analogous (sub) sub-section, from m. 333 to the downbeat of m. 356, implies b minor and is also 87 quarter-notes long (the sum of 1,2,3,5,8,13,21,34 is 87). There are two more pairs of equal-duration sub-sections -- m. 356 (third eighth-note) to m. 370 (downbeat eighth-note) implying G major paired with m. 437 to m. 450 implying g minor; and m. 370 (remainder) to m. 399 implying d minor paired with m. 413 to 436 implying D major. These pairs of sub-sections consist of 55 and 89 quarter-notes respectively (the next two Fibonacci numbers). The remaining sub-section of a7 is the center of Ring. As the center of a palindrome, this sub-section has no analogous mate. The pc emphasized most in this sub-section (other than D, pc 0) is A-flat, or pc 6. Pc 6 also had no mate in the dyadic pairings illustrated in figure 4 that form the basis of the pc structure of Ring. The duration of this sub-section, 58 quarter-notes, would seem unrelated to the Fibonacci series, and therefore out
of place in sub-section a7 (or in Ring for that matter). Figure 16 shows the origin of that duration to be the result of the intersection of two Fibonacci series, one starting at the beginning of sub-section a7 and proceeding forward through the piece and the other starting at the end of a7 and receding backward.

Figure 16 -- intersecting Fibonacci series of a7

<table>
<thead>
<tr>
<th></th>
<th>b minor</th>
<th>G major</th>
<th>d minor</th>
<th>A-flat</th>
<th>whole-tone</th>
<th>D major</th>
<th>g minor</th>
<th>B-flat major</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1+2+3+5+8+13+21+34</td>
<td>55</td>
<td>89</td>
<td>58</td>
<td>89</td>
<td>55</td>
<td>34</td>
<td>21+13+8+5+3+2+1</td>
</tr>
</tbody>
</table>

Although section B, when segmented, reveals the palindromic structure of Ring, in its entirety it forms the next larger duration in the Fibonacci series (less ten measures). For this reason we will discuss it here as one large unit. Because it contains the text, section B could be said to be dominated by the women's choir. Certainly a large part of B consists of the choir accompanied by orchestra. Much of B, however, occurs before and after the declamation of the text. In these areas, the orchestration is more homogeneous: there is no dominant orchestra section. There is, however, a dominant rhythmic motive. This pervasive rhythmic combination consists of durations organized around the Fibonacci series. Some examples of such rhythms (but by no means all) appear in figure 17.

As it would take an inordinate number of pages to list all the inter-related components of Ring, the examples presented in this discussion of the form of Ring should suffice to demonstrate that organization according to the principles of structural hierarchy is of extreme importance throughout the work. Such organization makes Ring truly organic: all of Ring's elements are intended to refer back to the central idea, that of a "ring" -- not just one of its manifestations or meanings, but many of them.
Figure 17 -- examples of Fibonacci proportioned rhythms in section B

Double Bass mm. 540-543

Viola mm. 642-645

Clarinet mm. 646-647

Horns mm. 667-668

Violin mm. 670-673

CONCLUSION

References to composers and compositions that have influenced the composition of Ring, and discussion of Ring’s position in the repertoire have been reserved for the conclusion of this paper primarily because the reader cannot understand the implications of such comments if he or she is not familiar with the piece. Also, these topics are outside the primary concern of the entire preceding discussion of the actual content of Ring.
This paper, however, also attempts to explain something to which remarks about compositional influences are germane: why is this piece the way it is? In spite of meticulous care in pointing out the various connections and relationships which relate one part of the work to another and the piece as a whole to its text and the text to its central theme, this question remains difficult to answer. The piece is the way it is because the composer is who he is -- I am who I am.

I am the result of my experiences. I was raised listening to popular musical idioms, particularly rock and roll, and my first experiences as a composer were writing songs that I would sing myself with guitar accompaniment. With this background, it is no surprise that the piece is rather bombastic and loud. This may also be indicative of my nationality. Certainly the stereotypical American is noisy, aggressive, and not the least bit subtle. American culture also affects the materials I use. Triads and consonance have never been abandoned completely in the United States, even in the darkest serialist night of the 1950's and 60's. Those composers who have been embraced by the nation stand as testimony to this fact. Copland, Gershwin, Bernstein -- these are the names that the average American might mention if asked to name American composers of concert music. These, then, are some of my influences. There is Copland in the quartal harmony of the sections based on the (0,5,7) trichord; there is Gershwin in the ten pc tutti chords, voiced and orchestrated like jazz chords full of extensions and separated by unequal numbers of beats as though syncopated; and there is Bernstein in the emphasis of tritonal relationships (in sub-section a7 in particular). John Adams, though familiar to most American musicians, is still unknown outside the orchestra-concert-attending public. Nevertheless, his influence is more strongly felt in the piece than perhaps any other. Adams’
Harmonium, Harmonielehre, and A Short Ride in a Fast Machine all contain long sections of static harmonic rhythm, thick orchestration, and driving, motoric rhythms. Ring shares these characteristics with Adams' music, but rock and roll is the likely progenitor in both cases.

A university education has extended my experiences into the distant and recent past, and to influences outside my own culture. Some of the European composers who have influenced me have already been mentioned. I am deeply indebted to Bartók, whose palindromic structures in works such as Music for Strings, Percussion and Celeste, serve as a model, as do his use of the Fibonacci series and the golden section. The influence of Debussy's use of pentatonic sets and whole-tone scales is also evident in Ring, although I arrived at their use through different means. The fact that Ring involves the segmentation of the aggregate definitely could not have happened without the twelve-tone system of Schoenberg and all the developments of that system that have occurred since its introduction. There are also modernist elements in Ring, such as moments of controlled improvisation, extended instrumental technique, and vocal sounds made by members of the orchestra. These elements would not be there, or even be considered acceptable, had it not been for composers such as Cage, Crumb, Berio, Lutoslawski, and others too numerous to name. The truth is, though, at no time during the composition of Ring (at least none that I am aware of) did I consciously think, "So and so did something really great in that piece. I want to use that." Instead, the content of the piece is that which I have been taught, either by life experience or university education. Thankfully, I have learned much.

As for Ring's position in the literature, it is not unlike other works for orchestra and choir, though, perhaps, not as large. These include Adams'
*Harmonium*, Debussy's *Nocturnes*, and Schoenberg's *Gurrelieder*. What sets *Ring* apart from these works and others is its intensely personal nature. In spite of its loudness and moments of dissonance, it really is an 18 minute love song. This, too, is a legacy of rock and roll and other popular genres, that have always had as their subject matter personal issues, such as anger, sadness, sex, mental instability, political disenfranchisement, and, of course, love. This personal nature is what makes popular music popular. People identify with the emotions of the person expressing those emotions. They see themselves, or someone they know, or even someone they wish they were or knew. Perhaps in this way *Ring* forms a link between concert music and popular music. Perhaps what I have said in *Ring* about Wendy and her qualities and my admiration for her, both in music and in words, will affect some listeners as more than abstract, organized sound, and make them think of someone they care about more carefully and deeply. If so, then *Ring* will have achieved its ultimate goal, not a pitch goal or structural goal, but the goal of communication, which, in one way or another, is the intent of all art.
WORKS CITED


URL:
http://www.mcs.surrey.ac.uk/Personal/R.Knott/Fibonacci/fibInArt.html


Ring
for orchestra and antiphonal (stereo) women’s choir

by

John Alan Gerhold

Instrumentation:
piccolo (doubling flute), 2 flutes, 2 oboes, English horn, 2 clarinets in B-flat, bass clarinet, 2 bassoons, contra-bassoon, 4 horns, 4 trumpets, 2 tenor trombones, bass trombone, tuba, percussion (3 players, see below), timpani, harp, piano, SA choir (right), SA choir (left), and standard strings.

Performance Notes:
The following symbols appear in the score to designate the various percussion instruments: $\mathcal{G} = $ glockenspiel, $\mathcal{V} = $ vibraphone, $\mathcal{T} = $ tubular bells, $\mathcal{W} = $ wind chimes, $\mathcal{S} = $ suspended cymbal (use soft beaters unless otherwise noted), $\mathcal{O} = $ tam tam, $\mathcal{B} = $ bass drum, $\mathcal{P} = $ snare drum, $\mathcal{X} = $ high medium and low toms, $\mathcal{D} = $ drum kit, and $\mathcal{A} = $ triangle.

The choir part contains text in IPA (international phonetic alphabet). Such syllables appear within backslashes, ie. /u/. During sections containing this type of text, the syllables should melt into one another as though they were part of the same word, unless separated by rests. Do not use glottal attacks.
* Depress keys silently, then add sostenuto pedal.
Mysteriously

Denote sounding pitch.
* Depress silently. Add sostenuto pedal.
Play one note at a time from the given set in random order (for the harp, the given set is the current pedal setting using notes from any register).

The improvised rhythm should increase and decrease in activity as wave frequency increases and decreases.
* Crescendo and diminuendo between pp and mp ad lib. Take quick breaths as needed.
* Close to final consonant and hiss for rotated duration.

** Slide final "th" of "breath" with the beginning "th" of "the."
*Alto close to "in" and has: Elide with "the."
* Whisper loudley the word "touch," rhythm ad lib. Each player should proceed at his/her own pace without synchronizing sections.