SWALLOW, EGG, CHRYSANTHEMUM

MUSIC COMPOSITION WITH DOCUMENT

by

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Abstract

Swallow, Egg, Chrysanthemum is a sixteen minute work for piano and orchestra. The title refers to symbols from Greek, Western and Asian cultures, with all of the symbols being associated with life, death, or resurrection. Over the course of the piece the interaction of the piano with the orchestra creates a metaphor for the journey of the human soul through the three states of existence. Each of the three contiguous movements carries the name of one of the symbols, whose physical aspects influence the internal form of the movement. In recognition of the conflict between an acceptance of life and death, and a belief in life, death and resurrection, the work contains coexisting two- and three- part forms. At the temporal level, “Swallow” is balanced by “Egg” and “Chrysanthemum”, and this balance is aided by a blurring of the boundary between the last two movements.

The musical language of the work is based in part on the use of cyclical, diminishing permutations of pitch collections, which are themselves derived from a master pitch group. The permutations reduce the number of pitches in each collection, creating an apparent “zeroing in” on a single pitch or “tonic goal”. As a result, moving backwards or forwards through the reductive process can increase or decrease the musical tension of a particular passage, by altering the number of pitches present. Twelve harmonic areas are created using this technique, and over the course of the work each of them is touched upon, with certain ones being of greater importance.

Foreshadowing has been used in the form of the work as a unifying device and is present at the micro and macro levels. The form of the Introduction can be mapped onto the first two movements, and onto the piece as a whole. In the last movement a process of postshadowing occurs, whereby earlier material is reinterpreted and transformed in a summation of the work.
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INTRODUCTION

*Swallow, Egg, Chrysanthemum* is a sixteen minute work for piano and orchestra, in which the musical roles of the soloist and the ensemble combine to create a metaphor for the soul’s progression through life, death and resurrection. The conflict between an acknowledgement of life and death, and a belief in life, death and an afterlife is reflected in the coexistence of a two-part and a three-part form, creating a structural tension. The two-part form is the weaker structure, and is created, in part, through a temporal balance between the length of the first movement, and the combined lengths of the second and third movements. This formal interpretation is assisted by a blurring of the division between the second and third movements. The three-part form occurs through differences in such areas as tempo, texture, dynamics, harmonic structures, melodic lines, and orchestration, with these differences helping to define the musical character of each of the movements.

In both the two- and three-part forms the piano represents the human soul, and the orchestra assumes the role of the continuum of time from the point of the individual’s conception. Each of the movements can represent a different stage within the continuum, but the relation of movements to states of being is not necessarily direct, due to the coexistent forms in the work.

The musical language of the work is based on a process of cyclical permutation of primary pitch material, but the process used in this work has the added refinement of gradually reducing the number of elements in the pitch collections. The complete permutation of each initial pitch group results in one remaining pitch, which is arbitrarily labeled as the “tonic-goal”. By using this technique, progressions of pitches are
established, and these progressions are used to help define harmonic areas and melodic patterns.

Throughout the work, these harmonic areas and melodic patterns assist in the structural delineation of the music. In general, different musical ideas are associated with different harmonic areas, and these ideas may be supported or opposed with rhythmic, dynamic, timbral or temporal devices.

THE USE OF SYMBOL AND METAPHOR

The title of the work refers to symbols representative of life, death and resurrection by Greek, Western and Asian cultures respectively. In Greek folklore, the swallow is the harbinger of spring, and is considered to be good luck. A classical Greek fable tells of swallows dying in their nests in clay cliffs during autumn, and links their springtime reappearance with resurrection. In Western secular culture, the egg has long been held as symbolic of the cyclical nature of life, and as representative of fertility and new growth. Within the Christian Church it is associated with the season of Easter, the time of celebration of Christ’s resurrection. In Japanese culture, washing with dew from the chrysanthemum is believed to produce longevity, and the flower and chrysanthemum wine are associated with the autumn rice harvest festival. It is also a very common flower in funeral ceremonies of Shinto beliefs, and during the last century it came to symbolize the god-Emperor.

Thus, the chosen symbols are associated with spring’s arrival, resurrection, fertility, cyclical life, longevity, the autumn harvest, death, and the god-head. The use of
symbols from different cultures is in recognition of the universal nature of our attempts to understand our lives, and to attach purpose to our existence. The belief in an afterlife is reflected in the title by the “Chrysanthemum” interrupting the cycle of “Swallow” and “Egg”. However, the title may also be viewed as symbolizing only life and death, with the swallow and egg being representative of the former, and the chrysanthemum being symbolic of the latter. From this point of view, the title itself could be viewed as supportive of both two- and three-part forms.

The large-scale integration of the two-part form into this work of three movements occurs through a temporal balance, in which the length of the first movement is balanced by the combined lengths of the second and third. The clearly defined division between the first two movements, and the ambiguous junction between the second and third movements assist in supporting a binary interpretation of the form.

Within the piece there are different levels of specific musical reference to each of the symbols. In the first movement — “Swallow” — the ternary form is a result of contrasting the opening motoric figurations with introspective, more rhythmically complex writing, prior to the reappearance of active lines. The active-passive-active character of the form’s sections relates to the above-mentioned classical Greek fable, with the introspective section representing the swallows’ apparent deaths. A second relation between form and symbol is found in the parallel between active-passive-active, and wing-body-wing. These two relations contain differences, for the first promotes the idea of stasis during the middle section (death), which is then followed by a reawakening. In contrast, the second relation promotes the sense of life at all times, with the outer sections representing physical movement, and the inner section hiding complex biological and mental processes.
In the second movement, the symbol of the egg is used in the creation of a metaphor for death and resurrection. Only the piano and strings are present in this movement, with the absence of the winds and percussion being symbolic of the lack of breath and internal rhythms during death. In the strings, each voice of an eight-part canon forms a layer of “shell” around the piano. Eventually the piano finds the weak point in the shell, escapes the harmonic constraints of the canon, and begins a solo passage.

The symbol of the egg in association with the conflict between life and death is particularly apt, since the unbroken egg is both a womb and a prison. Failure to escape from the prison will result in death, as will too early an emergence. In this movement, the piano’s successful emergence from the “egg” (the canon), and the subsequent harmonic and melodic exploration introduces a symbolical problem: any recapitulation by the piano may be construed as a re-entry into the egg or a reversal in time, yet the cyclic nature of the form and function of an egg seems to demand some form of recapitulation. To accommodate these conflicting ideas a more complex formal structure is necessary; the strings recapitulate the opening material in diminished retrograde at the original tempo, closing the shell of the egg, while the piano continues in a different tempo to develop new material with the winds, brass and percussion. As a result, while the strings are completing the second movement in ternary form, the piano is completing a binary form before joining with the remainder of the orchestra to start the third movement.

The third movement contains four sections, and each of these “flowers” in some manner, by increasing one or more of the rhythmic, dynamic, timbral or harmonic activities. The first three sections make use of previously appearing gestures or techniques, but do not quote earlier material in a recapitulatory sense. Rather, these
sections may be likened to memories from life, which are discrete rather than continuous, and which are not necessarily of events of major importance. The final section is a modified retrograde of the transition from "Swallow" to "Egg", a transition which in its earlier context carries the soul from life to death. Here, the reversal of the transition's harmonic progressions and dynamic changes, coupled with the absorption of the piano part into the overall orchestration, creates a metaphor for the soul's assumption.

THE LANGUAGE

Procedure of permutation

The harmonic language of the work is created using a system of permutation which is modeled on that used by Messiaen in *Chronochromie*. In Messiaen's system, thirty-two rhythmic patterns were created by symmetrically reordering the elements of a rhythmic set. Figure 1 shows how the process would work on a set with five elements, using a pattern of 4,1,2,5,3. (The pattern refers to the fourth element, the first, the second, and so on.)

Using this pattern, the fourth element of the initial set becomes the first element in the new set, and the first element of the initial set becomes the second element in the new set. This continues through the entire pattern until all five elements have been reordered to create the new set. The new set then becomes the source for the creation of the next set.
Figure 1. Symmetrical permutation applied to a five element set, using 4,1,2,5,3 as the pattern of repeating permutation.

In Swallow, Egg, Chrysanthemum the system of permutation is similar to Messaien's, but the permutations are applied to pitch, and the process is not strict. The initial material — the master pitch group — is shown in Figure 2.

Figure 2. The master pitch group

From these twelve pitches, eight were extracted and permuted, with the eight pitches selected being those numbered 2,3,5,8,1,4,6, and 7 in the master pitch group.
This ordering was created by using two Fibonacci series in which the differences between successive numbers in the second series are the retrograde of the differences of the first series. Thus, the first four numbers creates differences of 1, 2 and 3, while the last four have differences of 3, 2 and 1, creating a symmetrical form in the order of permutation.

After each permutation of a collection, the highest order number is dropped from the system of permutation, resulting in a reduction in the subsequent collection size by one, a process which I refer to as “cyclical, reductional permutation”. For instance, after reordering the first eight pitches using 2, 3, 5, 8, 1, 4, 6 and 7, the number 8 is dropped from the system of permutation, and only seven notes are selected on the next pass through the collection (2, 3, 5, 1, 4, 6, 7). Figure 4 shows the application of this process to the original pitch material.
Figure 4. Result of cyclical, reductional permutation on the extracted pitches
This recursive application of the technique continues down to the last two permutations. At this point the pattern is changed, and the lowest numbered pitch is dropped, so that in the first harmonic area, the tonic goal is Ab, instead of F#.

The effect of playing through the resulting note orderings is one of “zeroing in” on tonic goal of the original collection of eight pitches. Moving forwards through the permutations creates a lessening of harmonic tension as the number of “non-tonic” pitches is reduced, while moving backwards through the permutations can create an increase in harmonic tension.

To generate the next series of permutations, the original master row is rotated by one element, with the first pitch being moved to the last position. Eight pitches are then extracted using the Fibonacci-based selection process, and cyclical, reductional permutation is applied to them. In this way, twelve “harmonic areas” are created through the processes of rotation and cyclical, reductional permutation. (See Figure 5.)

**Harmonic area**

The term “harmonic area” is used rather than “key centre” because the piece is not written within the traditional tonal framework. Also, the process of pitch selection does not attempt to establish an acoustically-based pitch and interval hierarchy using the eight extracted pitches. (Attempts to create vertical sonorities which would be consistent in hierarchy through all twelve harmonic areas proved to be fruitless.) The hierarchy which does exist is the result of simple, mathematical processes which arbitrarily result in the eighth pitch of any twelve-pitch collection being the tonic goal.
When using the permutations, one cannot refer to a dominant, mediant or subdominant harmony in relation to the tonic goal. However, as one moves closer to or farther from a progression's tonic goal, one is aware of increasing or decreasing harmonic tension by the changing rate of the tonic note's occurrence and by the introduction or removal of pitches from the progression. Thus, as one moves further back in the progression (leftward on the graph), the sense of tonic is weakened, facilitating modulations into other harmonic areas. Such modulations are especially effective if there is considerable overlap in the pitches present in the two harmonic areas. For example, the harmonic areas of B♭ and A have six notes in common, making a smooth transition along the path from the tonic goal of B♭, back through the B♭ permutations, into the A permutations and down to the A tonic goal. Conversely, the harmonic areas of C♯ and D have only four pitches in common, resulting in a more abrupt change from one harmonic area to the other. (As in tonal harmony, the greater the number of common tones between harmonic areas, the stronger the relation.)

**Harmonic form**

The piece uses each of the twelve harmonic areas, but certain areas are of greater importance than others. In discussing the use of harmonic areas, changes from one area to another are referred to as progressions or modulations. These terms are not meant to imply a hierarchy of harmonic strata, but are used as a convenient and familiar nomenclature.

The selection and ordering of the harmonic areas for each of the movements was the result of a desire to use descent and ascent archetypes at the harmonic level, as well as an awareness of symmetries within the graph of harmonic areas (Figure 5). The twelve
harmonic areas were divided into two groups, based on their positions in the graph, resulting in the groups Ab, Eb, D, E, F, F# and G, C#, B, Bb, C, A. The first harmonic area of each (Ab and G) became the first two areas to be used. E became the final area of the first movement, since it continued the harmonic descent of Ab and G, and on the graph it is positioned midway between the first harmonic areas of the two groups. Figure 6 shows the harmonic areas and formal divisions of the piece.

Since the first two harmonic areas are six steps apart on the graph, it was decided that the area for the second movement would also be six steps away from the last area of the first movement. This decision was supported (or rationalized) by the resulting Bb harmonic area being a tritone away from the previous E material, an appropriate tonal relation between the life and death sections of the piece, since the tritone is often considered to be the most dissonant interval in tonal music.

While the strings remain in the Bb area throughout the second movement, their influence on the piano is not absolute, and other harmonic areas are explored by the soloist. The areas of A, B, C and C# were chosen because they form an ascending progression, and because they are distributed symmetrically around the Bb harmonic area on the graph. The rising harmonic progression is especially important, for it negates the descending harmonic motion of the first movement, and initiates an upward motion which continues on through the third movement.

The third movement explores the harmonic areas of D, Eb, F and F#. Although E is not a factor in the large-scale harmonic direction of this movement, the harmonic areas used are symmetrical about the E on the graph of harmonic derivations (Figure 5). E was the last harmonic area of the first movement — the movement associated with life — so
Figure 6. Structural divisions in *Swallow, Egg, Chrysanthemum.*
Percentages based on temporal length of movements.
it is appropriate that the harmonic areas of the resurrection movement can be derived by transferring the symmetry of the "death" harmonic areas onto the life harmonic area E.

Two interruptions occur within the harmonic form of the piece, and both are transitional. The first occurs from measures 133 to 156, and the second at the end of the piece from measures 243 to 266. In both instances, all twelve harmonic areas are presented through the use of chords built from the five-pitch collections created in the process of reductional permutation. While the second transition is a retrograde of the first, the roles of the two are different. The first transition creates a smooth flow between movements, joining two harmonic areas, and fulfilling the traditional role of a transition. The second transition is the last large gesture of the piece, and as such, it becomes the final goal of the musical structure. However, because it is a transition, it must carry us forward, and in this sense it fulfils the role of a transition into the unknown.

Rhythmic concerns

While large-scale, metrical rhythmic concerns were not of primary importance in the formal conception of the work, a few observations may be made as to the manner in which such rhythm assists the formal structure. The overall rhythmic sense of the piece is one of increasing complexity through the first two movements, followed by a reduction of rhythmic tension through the last movement. At its simplest interpretation, the rhythmic structure can be attached directly to the symbolic aspects of the work, with the motoric drive of the first movement representing the forward motion of life in time, and the tension of the interwoven voices in the second movement representing the grip of death. The easing and eventual elimination of rhythmic tension through the third movement supports the concepts of resurrection and assumption.
Direction and gesture of sections

At various times in the piece there is an exponential increase in rhythmic activity, culminating in a complex rhythmic gesture announcing the next section. This gesture appears twice in the Introduction, the first time in measures 1 to 4, where it precedes the “ametric” section of bars 5 and 6, and the second time as a very active transition into the first movement. Other examples include parts of the first movement (mm. 12 - 45, 62 - 82), the solo piano section of the second movement, and the first three divisions of the last movement.

This pattern of “simple-to-complex” is reinforced by certain aspects of the music, while other aspects may work against the pattern. Reinforcement can include increasing the dynamics, bandwidth, texture, or tempo, and in some cases there is a concurrent increase in all attributes. Examples of opposition to this pattern are found in the strings in the second movement (especially after their re-entry at measure 200), and in the first transition, which is discussed below.

The role of the piano

While the symbolic role of the piano is that of the soul, its musical role is that of a protagonist who attempts to influence the harmonic and rhythmic direction of each movement. This influence is quite strong at the beginning of the piece, but during “Chrysanthemum” it is eliminated, and the piano is absorbed into the orchestra during the final transition.
Orchestration

The instrumentation of the work consists of doubled winds, four horns, two trumpets, three trombones, two percussion (no timpani), piano and, in the strings, a minimum of six each of first and second violins, four violas, four 'cellos, and three basses. There is an emphasis on colour in the outer movements, created in part by the scoring of the winds, by the choice of percussion, and by the use of mutes and stopping in the brass.

In the first movement, the motoric sections are all derived from the piano's activity, and the orchestra supports or comments on this activity through doubling the line, or by providing brief episodes of contrasting or complementary material. In the absence of the piano, the entire orchestra is involved in a section of widely contrasting colour (mm. 83 -104), which is enhanced by the large range of dynamics, rhythmic materials, registers and articulations.

In the second movement, only the strings and piano are used, with the absence of winds and percussion being symbolic of the lack of breath and biological rhythms during death. In this movement the reduction of the orchestration to solo piano is countered by the subsequent expansion of the range used by the piano.

In the final movement, the orchestra is used in a manner similar to the first movement. However, the waning of the piano's influence on the harmonic and rhythmic directions eliminates the piano's importance as a soloist, and it assumes the role of a member of the orchestra.

Although orchestrational techniques are important throughout the work, the
previously mentioned transitions are particularly dependent upon orchestration for much of their effectiveness. They are discussed in detail below.

THE INTRODUCTION

Goals of the Introduction

Symbolically, the Introduction begins at the point of human conception, and opens with a “conception motif” in the piano and percussion. This motif recurs in different forms at strategic points in the first movement, and also announces the final transition of the piece. The goals of the Introduction include the presentation of this motif, the foreshadowing of the conflict between the harmonic areas of Ab and G, and the establishment of a micro-structure which operates throughout the piece in local sections, entire movements, and in the work as a whole. The foreshadowing of harmonic conflict is achieved through the presentation of Ab pitches in the strings in the first half of the Introduction, and both Ab and G in the second half. A descending glissando (portamento) by the trombones, beginning on both notes, foreshadows the harmonic conflict of the first movement and its eventual resolution to a lower harmonic area, and serves to join the two halves.

Mapping

The act of applying a formal structure from one dimension onto another dimension is referred to as “mapping”. This activity is not uncommon within serial
music, where it is possible to assign numeric values to music parameters, and then map orderings from one set of parameters onto another.

This piece is not a serial work, but it does make use of mapping in conjunction with the formal organization of rhythm, timbre, register, dynamics and texture. While not consistently used, the technique is applied at both micro to macro levels. For instance, ternary divisions can be seen in the Introduction, the first movement, and the work as a whole. The overall growth of the Introduction from passive to active, or from simple to complex, is paralleled throughout the piece, from the local musical level to the abstract symbolic level. Even the dualist interpretation of the overall form of this work can be heard in the Introduction, where the two presentations of the conception motif can be interpreted as announcing the beginnings of two similar sections.

"Counter relations" are ones which operate against the predominant direction of change. Such relations occur in the large transitions, where parameters (e.g. timbre or dynamics) may change from complex to simple. Other counter-relations may be heard in the middle section of the first movement, where the rigid, notated materials of the winds and brass give way to sections using aleatoric methods.
Goals of the movement

There are various compositional goals in the first movement, but of primary importance is the establishment of the piano's independence from the orchestra during the first two sections. In the first section (mm. 12 - 82) this is achieved through the nearly constant presence of the piano (as opposed to the intermittent appearances by the instruments of the orchestra as they double the piano's material), by the piano's introduction of compound rhythmic figures against the omnipresent motoric sixteenths, and by the piano's use of pitch material from outside of the Ab harmonic area (i.e., the use of the pitches D, Eb, E or F).

In the second section (mm. 83 - 104), the independence of the piano is demonstrated by its almost complete disappearance from the section, except for its presentations of conception motif variations, which act as announcements of compound rhythmic figures in other parts of the orchestra. With the disappearance of the piano, the orchestra loses its forward momentum, and the section becomes introspective.

In the third section, (mm. 105 - 132), the piano reappears as a motoric force, generating a series of orchestral entries. The first of these orchestral entries is by the percussion, where rhythmic cells are exchanged over the piano's developing line. With the entry of the cellos in measure 113 (announced by compound rhythms in the piano), the rhythms and harmonic explorations of the piano's material spread to all of the string lines, and the music drives forward to the transition. During this third section, the independent melodic line of the piano becomes merged with similar lines in the strings, foreshadowing the eventual assimilation of the piano in the third movement.
The integration of two- and three-part forms

The integration of two- and three-part forms in the first movement is achieved at various levels, and in various ways. The most obvious reference is to the three-part structure of the first movement, delineated by the three sections previously referred to as active-passive-active. Moreover, the first section is itself a ternary structure containing a contrasting middle section, with the segments occurring in measures 12 - 45, 45 - 63, and 63 - 82.

In the middle section of the first movement (mm. 82 - 104), the three part form is delineated by timbre rather than by rhythm. In the first segment, the strings provide the timbral underlay for measures 83 to 91. In measure 91 the woodwinds enter to mix their timbres with the strings, creating a second timbral division, and in measure 101 the third division is created when the brass replace the winds.

The two-part forms are not as easy to perceive as the three-part, but the most obvious example of a binary delineation occurs at the changes of rhythm, texture and tempo in measure 83. (These changes define the beginning of a second section for both two- and three-part interpretations of the movement.) The boundary between the second and third sections is blurred; the second section ends at measure 115, while the third section starts at measure 105. Due to this, a strong parallel exists between this movement and the two-part interpretation of the entire piece, which also involves an overlapping of the second and third divisions.
The conflict between harmonic areas

One of the important goals of the first movement is the establishment of the two harmonic areas foreshadowed by the Introduction, and the resolution of the subsequent harmonic tension. The establishment of harmonic areas occurs through the tracing out of the permutations, the emphasizing of certain pitches and pitch groupings by accentuation, dynamics, durations, or orchestration, and through the contrasting of harmonic area pitch material with non-area pitches. In establishing a harmonic area, trills with the notes Ab/G# or G as one of the components are common, and provide a locally constant reiteration of the tonic-goal of a harmonic area. Chords created from the last four or five pitches of a permutation (although not always with the tonic-goal present), provide reinforcement of the harmonic area, and examples of this occur in measure 16 in the strings and piano, and in measure 28 in the piano, strings and winds. As the movement develops, there are a growing number of instances of simultaneous presentations of both Ab and G, and their respective harmonic areas, thereby increasing the harmonic tension.

In the second section, the harmonic conflict continues as the violins present pitches from both areas. The conflict is further accentuated by the horns' pulsing figure which uses only Ab and G. However, the actual change in harmonic balance from Ab to G occurs with the entry of the brass, where the shift of harmonic area is signalled by the pitches E and F, which are foreign to the harmonic area of Ab.

The resolution of the Ab - G conflict to the harmonic area of E occurs through the intervention of the piano, which begins directing the harmonic flow towards E at measure 105. Here, the piano enters in a G orientation, picking up from the brass. Following a compound rhythm statement in measures 112 - 113, the piano presents G material in the
left hand, and Ab material in the right. This dual harmonic orientation influences the subsequent entries by the strings, for both Ab and G permutations are introduced and followed, some more strictly than others. Finally, in measure 132, the entire string family is oriented towards E, in preparation for the beginning of the transition into the middle movement. However, having set the harmonic changes in motion, the piano now remains defiantly in G, and it is only after the beginning of the transition that it resolves its own harmonic tension by moving into the E harmonic area, although it attempts to maintain its independence from the transitional process through rhythmic, dynamic and articulative methods.

The transition into the second movement

The transition into the second movement symbolizes the crossover from life to death, and is effected through harmonic, dynamic, durational and timbral changes. The modifications are designed to create the illusion of gradually moving from two- to three-dimensional timbral space, and take place amid shifting harmonies as all twelve harmonic areas are touched upon.

In determining the order of presentation for the harmonic material, an initial decision was made to use chords constructed from the fourth permutation of each harmonic area, so that only five pitches were present in each chord. This decision was based on acoustic and perceptive restrictions. The acoustic restriction was that if more than five pitches were used, the results of later interval manipulations might cover too large a bandwidth to be effectively scored in the orchestra. The perceptive restriction was that the creation of chords with more than five pitches would result in fewer differences between some chords during progressions, while any fewer than five notes would result
in chords of less interest.

In preparation for the ordering of the harmonic areas, the five-note collections were placed in normal form, and from each a list of intervals (in semitones) was created. Since the actual pitch content of each list was important, and no transpositions were to be done, it was not necessary to rework those lists which were not in standard form. (For instance, the pitch list for the tonic goal $E$ is $02348$, but in Forte's standard representation it would be [0 1 2 4 8].) Figure 7 shows the results of this process.

**Figure 7. Normal form of the five-pitch collections.**

<table>
<thead>
<tr>
<th>Tonic goal</th>
<th>Original collection</th>
<th>Normal form</th>
<th>Pitch list</th>
</tr>
</thead>
<tbody>
<tr>
<td>$A_b$</td>
<td><img src="image" alt="Ab" /></td>
<td><img src="image" alt="Ab" /></td>
<td>0 1 2 4 7</td>
</tr>
<tr>
<td>$E_b$</td>
<td><img src="image" alt="Eb" /></td>
<td><img src="image" alt="Eb" /></td>
<td>0 1 2 4 8</td>
</tr>
<tr>
<td>$D$</td>
<td><img src="image" alt="D" /></td>
<td><img src="image" alt="D" /></td>
<td>0 1 2 4 5</td>
</tr>
<tr>
<td>$E$</td>
<td><img src="image" alt="E" /></td>
<td><img src="image" alt="E" /></td>
<td>0 2 3 4 8</td>
</tr>
<tr>
<td>$F$</td>
<td><img src="image" alt="F" /></td>
<td><img src="image" alt="F" /></td>
<td>0 1 3 6 8</td>
</tr>
<tr>
<td>$F^#$</td>
<td><img src="image" alt="F#" /></td>
<td><img src="image" alt="F#" /></td>
<td>0 2 3 6 8</td>
</tr>
<tr>
<td>$G$</td>
<td><img src="image" alt="G" /></td>
<td><img src="image" alt="G" /></td>
<td>0 1 4 5 6</td>
</tr>
<tr>
<td>$C^#$</td>
<td><img src="image" alt="C#" /></td>
<td><img src="image" alt="C#" /></td>
<td>0 1 2 4 7</td>
</tr>
<tr>
<td>$B$</td>
<td><img src="image" alt="B" /></td>
<td><img src="image" alt="B" /></td>
<td>0 3 4 5 7</td>
</tr>
<tr>
<td>$B^#$</td>
<td><img src="image" alt="B#" /></td>
<td><img src="image" alt="B#" /></td>
<td>0 2 3 5 8</td>
</tr>
<tr>
<td>$C$</td>
<td><img src="image" alt="C" /></td>
<td><img src="image" alt="C" /></td>
<td>0 1 4 5 6</td>
</tr>
<tr>
<td>$A$</td>
<td><img src="image" alt="A" /></td>
<td><img src="image" alt="A" /></td>
<td>0 1 2 4 6</td>
</tr>
</tbody>
</table>
The interval lists were then placed in reverse dictionary order according to the “left-packing” of the intervals. (“Left-packing” refers to smaller intervals being closer to the beginning of the list.) The resultant tonic-goal ordering, beginning with B, was used as the harmonic order of the progression.

Figure 8. The ordered five-pitch collections.

<table>
<thead>
<tr>
<th>Interval Distance Above Lowest Pitch</th>
<th>Tonic Goal</th>
</tr>
</thead>
<tbody>
<tr>
<td>03457</td>
<td>B</td>
</tr>
<tr>
<td>02368</td>
<td>F#</td>
</tr>
<tr>
<td>02358</td>
<td>Bb</td>
</tr>
<tr>
<td>02348</td>
<td>E</td>
</tr>
<tr>
<td>01456</td>
<td>C</td>
</tr>
<tr>
<td>01456</td>
<td>G</td>
</tr>
<tr>
<td>01368</td>
<td>F</td>
</tr>
<tr>
<td>01248</td>
<td>Eb</td>
</tr>
<tr>
<td>01247</td>
<td>C#</td>
</tr>
<tr>
<td>01247</td>
<td>Ab</td>
</tr>
<tr>
<td>01246</td>
<td>A</td>
</tr>
<tr>
<td>01245</td>
<td>D</td>
</tr>
</tbody>
</table>

Part of the transition’s role was to emphasize a change in timbral space, and to achieve this, the interval sets were inverted when scored, with the first note of each set being placed highest, and the following notes placed sequentially underneath. Figure 9 shows the results of this.
Figure 9. Expansion of the interval collections.

The processes of normal form and reverse-dictionary ordering, and the inversion of the intervals, control and affect the interval relations between successive chords of the progressions. This results in more and larger interval differences between the voices of adjacent chords at the beginning of the progression than at the end, so that the parallel motion in this section becomes progressively smoother.

The illusion of a move from two-dimensional to three-dimensional timbral space, depends upon the acceptance that the homogeneous timbre of a specific family of instruments, such as the brass or strings, contains less timbral depth than a mixed family of instruments. Therefore, within the orchestra, the timbre with the greatest depth will be that of the full orchestra. To that end, the most effective shift in timbral depth will occur through a sensitive control of the progressive mixing of timbres.
The scoring of the transition begins with the "pure" timbres of the different families and ends with the sound of the full orchestra. While the homogeneity of timbre is good for the strings, the concept of timbral purity is weakened in the case of the brass, and is quite questionable for the woodwind family. However, given the timbres of the various instruments, the application of the idea of timbral progression does create a gradual change of timbral depth.

As an important aid to the timbral shift, the dynamics of the transition begin at double forte, and end at double piano. The effect of this is a gradual reduction in the overtone content of each timbre, creating a progressively better blended sound. This loss of timbral detail is a parallel to the visual world where, as an object recedes from the viewer, there is a reduction in the perceived detail.

Although the total number of instruments which play simultaneously increases, at the local level the dynamics decrease, and in an ideal performance the volume would remain constant while the timbre shifted. Since it was recognized that this is quite unlikely in practice, the ideal performance was used as a model and not as a goal. However, this does not deny the fact that overall dynamic compensation will occur during the process of timbral shift.

The result of the transition is an arrival on the final harmonic area of D, but the influence of the independent piano, which has explored the E harmonic area during the transition, is felt as the strings reiterate the E chord, providing a harmonic resolution of the first movement at the end of the transition into the second.
EGG

Goals of the movement

Like the first movement, the second movement creates a situation of conflict between the piano and the orchestra, but the resolution of the conflict is somewhat unusual. The harmonic centre of this movement is Bb, a tritone away from the final harmonic area of the previous movement, and this area was chosen for symbolic reasons (the tritone and death) and graphic reasons (the harmonic centre is six places removed from E on the chart of permutations, the same separation as between Ab and G. See Figure 5). Throughout the movement the strings remain in Bb, while the piano explores other harmonic areas.

The physical characteristics of the egg influence the form and techniques used in this movement. An eight-voice canon in the strings creates a “shell”, surrounding the piano and restricting its melodic and harmonic movement. Encased by these layers, the piano is forced to play all parts of the canon, while exploring other harmonic areas in an attempt to discover the weak point of its prison. Diminution is applied to each of the canon’s voices, with later entering voices having smaller rhythmic values.

The piano announces each string entry with a quintuplet figure, and tries to escape the Bb orientation by investigating other harmonic areas. The first example of this investigation occurs in measures 166 - 168, where the left hand of the piano is doubling the canon, and the right hand is working through a D harmonic area permutation, in an unsuccessful attempt to break out. Between measures 171 and 180 the piano unsuccessfully explores the harmonic areas of D, C#, C and B. Finally, in measure 181,
it settles back into the Bb area. This chromatic descent of the harmonic areas from D to Bb represents the realization that escape from the egg must come from the application of inner forces; the piano is incapable of breaking the egg from outside of the harmonic area.

The area of escape

The piano's escape occurs at a structurally significant point. In measure 192 the second group of first violins overtakes the first group of second violins, who entered earlier in the canon. This is the weak point in the "shell", since this is the only point at which such an event occurs. Here, in effect, an inner layer of shell is pushed through an outer layer, and the piano takes advantage of this occurrence to escape the harmonic constraints imposed by the canon. As the piano begins its subsequent explorations, the strings drop out, symbolic of the abandonment of the shell, and of the soul's escape from death.

The piano solo

The piano solo begins in the harmonic area of A, and rises through B and C to arrive in the C# area in measure 200. Through this section the piano occasionally makes use of non-harmonic area pitches for added colour, but it remains closely aligned with the harmonic material of the area of exploration. The shift from A material to B material occurs at rehearsal letter J, where there is a vertical presentation of B material. During the next two systems, the B and C material is mixed, and the tonic-goal pitches are juxtaposed in trills. The successful shift to C during the trills is immediately followed by the combination of C and C# material, until a descending retrograde of the C permutation leads into measure 200 and the definite arrival in the C# harmonic area. At this point the
piano continues its solo in C# until the end of the movement at measure 203a.

Over the course of the piano solo a number of motifs are introduced. These motifs include the accelerating repetitions of a pitch or pitches, the block chords presented alone or in simple and compound rhythms, tremolos and trills, the short melodic figure announced by an upward leap, and the accelerating, descending, chromatic lines. Each of these motifs plays a role in maintaining the forward motion of the solo. For instance, as the number, density and rate of change of trills and tremolos increases, there is a thickening of texture and an increase in the energy. Linear figures, which operate at both foreground and background levels, provide direction, and contrast the chords of punctuation and the block chords. As the solo unfolds, these block chords increase in number, assuming an aspect of linearity and developing the local harmonic activity, to become the eventual culminating gesture of the solo.

The arrival of the piano solo in C# at measure 200 is the cue for the re-entry of the strings. As mentioned previously, certain aspects of the egg’s symbolism demand some form of recapitulation while other aspects require an on-going development. The solution to this formal problem lies in the use of coexisting forms. The strings work through the retrograde of the Bb permutation using the original tempo while reducing the dynamic level to triple piano, thereby completing the cycle and symbolically making the shell whole. The piano ignores the strings and begins the third movement in conjunction with the winds, brass and percussion, at a tempo nearly double that of the strings. The different tempi assist in delineating the independence of the two instrumental groups. The result is a ternary form in the strings, and a binary form in the piano, with an overlap of several bars.
CHRYSANTHEMUM

Goals of the movement

The compositional goals of this movement include the creation of a process of summation through postshadowing, the continuation of the rising harmonic pattern initiated by the piano in the second movement, the elimination of the piano’s independence, and the development of an open-ended transition. Also, since this last movement symbolizes, in part, the final stage in the transition from death to after-life, it is based on the life-to-death transition between the first and second movements. It was important, though, that the harmonic progression continue through the areas of D, Eb F and F#. In order to do this, it was necessary to modify the transition. This is discussed below.

The movement contains four sections, each of which bears some relation to earlier parts of the piece. These relations are like memories, which may or may not be of events of major importance, and which may or may not be accurate. Each section of “Chrysanthemum” flowers in some manner, symbolic of the physical aspects of the plant. This flowering is accomplished through modifications to rhythmic, dynamic, timbral or harmonic material.

In order to create the sense of postshadowing without direct recapitulation, each of the four sections makes use of material from the first movement, but the relative importance of the material is modified in each case. Mapping is at work here, for the large-scale order of the material remains the same, and the character is maintained at the local level. It is important to realize that due to the process of mapping, a restatement of
a gesture from the Introduction or first movement can be interpreted as a restatement of a parallel section from the second or third movements, or even as a restatement of an entire movement. Throughout this movement the review of earlier material maintains the original ordering, and thus symbolizes a review of the entire piece.

The solution to the problem of maintaining the rising harmonic line, while modelling the movement on earlier transition, lay in a symbolic modification. Since this transition is from death to after-life, it was appropriate to reverse the harmonic order of the life-to-death transition, resulting in D, A, Ab, C#, Eb, F, G, C, E, Bb, F#, B. With this done, D, Eb, F and F# occur in the required order in the list of harmonic areas. This new ordering allows for the use of all twelve harmonic areas, as long as the four harmonic areas of importance are signified in some manner. To this end, the arrival of each of these harmonic areas is marked by the appearance of an arpeggiated gesture similar to the piano's conception motif. For ease of discussion, such figures in the third movement are also referred to as conception motifs.

The first section of the third movement occurs between measures 203 and 212, overlapping the strings' completion of the second movement. Like the first section of Swallow, and the first movement as a whole, this section contains motoric and compound rhythms, and there is a contrasting section of lesser energy in the middle. A conception motif is presented by brass and winds in measure 205, generating the first transitional chord and marking the start of the D harmonic area. Overall, the growth of this section is marked by an increase in dynamics, bandwidth and texture.

The second section (measures 212 - 225) reinterprets specific gestures found in the middle section of the first movement, and by its character and harmonic stasis it is
related to the middle movement. The gestures consist of a triplet figure, long, high pitches, harmonic glissandi, and repeating, randomized material of limited pitch content. Unlike the first movement, here the gestures combine to create a gradual increase in activity and density. Again, it is the horns which perform the pulsing, triplet figure with timbre changes created by using stopped and open technique, but the high pitches are now taken by the solo flute, oboe and clarinet, creating a keening, ascending gesture which mixes with the ethereal harmonic glissandi of the violas. Midway through this section the upper strings introduce rapid pizzicati at triple piano, thickening the texture. Except in the viola glissandi, the number of pitches used increases, resulting in an increase in the local harmonic complexity. In measure 221 the trombones enter with a reference from the middle section of the Introduction, playing descending glissandi in the same register as the horn figures, thereby adding to the local density. A rhythmically complex figure is presented by the orchestra to close this section, and announces the move to the Ab harmonic area.

The third section (mm. 226 - 241) opens with a forte Ab transition chord, and then moves to scattered rhythmic presentations of the D, A and Ab transition chords. These irregular rhythms parallel those beginning in measure 105, and this section gathers momentum in a similar manner. In measure 231 there is a shift to the harmonic area of Eb, which is an important structural point, and therefore is marked by the appearance of a conception motif.

This third section includes a canon, which begins at measure 236 in the strings and flutes. The canon continues through to the end of the section, while the winds and brasses mix pitch material from Eb and F harmonic areas, and drive forward to the final transition which begins in measure 241.
The final transition

With the arrival of the structurally important F harmonic area in measure 241, the conception motif is presented by piano and percussion. It is at this point that the postshadowing process encounters material from the third movement itself. This results in the movement “remembering” itself, restarting the harmonic progressions of the transition upon which the third movement is based. This occurs in measures 245 - 246, where the brasses’ muted D chord, underneath the G material of the winds and percussion, restarts the progression. As in that first transition, there is an attempt to suggest a move from a two-dimensional to a three-dimensional timbral space through the gradual mixing of timbres. This time, though, the dynamics begin at piano and increase to triple forte, increasing the timbral detail. There is also a concurrent diminishing of the time between entries of the transitional chords, and an increase in their durations, resulting in an overlapping and clouding of the boundaries between the chords.

There is one last twist in the completion of the harmonic organization. The final harmonic centre of the transitional progression is B, but the final harmonic centre of the overall scheme is F#. The solution is to treat the B material as an “overshoot”, and resolve back to the F#.

Throughout the final transition the piano loses energy and identity, and in a move symbolic of absorption or assumption, the piano’s compound rhythms — reminiscent of a heart beat — are replaced by quieter tremolos which blend with the rest of the orchestra. However, due to the timbral, registral and dynamic levels, this is not an introspective ending, but one which is triumphant and extroverted.
SWALLOW, EGG, CHRYSDANTHEMUM

Instrumentation

2 Flutes
2 Oboes
2 Bb Clarinets
2 Bassoons
4 Horns
2 Trumpets
3 Trombones
2 Percussion  Vibraphone, Xylophone, Marimba, Glockenspiel,
               Roto Toms, Woodblock, Temple Blocks,
               Tam Tam, Tambourine, Jawbone, Bass Drum

Piano

Strings:  Minimum of 6,6,4,4,3
In Memoriam

G. A. R.
B. M. P.
G. & F. S.
SWALLOW, EGG, CHRYSANTHEMUM

C Score
Introduction
for piano and orchestra

Bob Pritchard 1992

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SOCAN