

Analysis of Crumb's *Mundus Canis*
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This paper will discuss referential collections in George Crumb's *Mundus Canis*. It will focus on how particular referential collections create continuity, contrast, and form within each movement. It will also discuss how referential collections interact with each other between movements to create continuity and contrast.

The following paragraph is an organizational overview of the paper. The first portion of this paper will discuss George Crumb's reason for writing this piece. The second portion of this paper will set criteria for what notes are included or excluded from referential collections in this analysis. The analysis begins on page three. It examines evidence that referential collection [012678] is the unifying collection throughout this piece. Next this paper examines special properties of set class [012678]. [012] is discussed as a generating cell of set class [012678]. Then other referential collections are discussed in terms of how they create formal A and B sections within each movement. The final portion of this paper discusses how referential collections interact between movements and throughout the piece as a whole.

Mundus Canis ("A Dog's World") by George Crumb is a piece for guitar and percussion. It was written for David Starobin and premiered in Cannes, France on January 20, 1998. In the program notes, Crumb writes that this piece ". . . metamorphosed into a little suite of five canine humoresques each being a portrait and character study of one of the Crumb family dogs." There are five movements entitled "Tammy," "Fritzi," "Heidel," "Emma-Jean," and "Yoda." Each movement is really a duet between percussion and guitar with both instruments contributing equally to the ensemble. Crumb writes "The addition of a percussionist, who

supplies a specific instrumental color for each piece, helped me to delineate each canine character.” The guitar also adds timbral color to each movement, and it contains all of the harmonic and melodic interest.

It is challenging to determine how to segment the guitar part. Which grace notes should be considered part of the harmony and which should not? Criteria must be set in order to remain consist in analyzing this piece. It is helpful that the percussion part is un-pitched. This simplifies the process of analysis because the percussion does not need to be considered harmonically. Yet there are still many challenges to determine which notes to include in a given referential collection and which notes to exclude. For instance, the first line of page 4, the movement entitled “Fritzi,” contains grace notes that are a half step above each primary note. The primary notes are all part of referential collection DIA-1 (see highlighted segment). The second line of page 4 contains graces that are all on the open strings of the guitar. The primary notes are all part of referential collection DIA-5 (see highlighted segment). All of these particular grace notes are not counted as part of the referential collection because they do not fit. Instead they appear to arise from idiomatic considerations particular to the guitar. The criteria for determining if graces will be counted is if they are purely idiomatic and don’t fit the collection, they will not be considered as part of the harmony.

At times, segmentation in this piece is challenging even though there is only one instrument. With only one instrument, register, rhythm, and melodic shape are the most important criteria to use to determine segmentation. Sometimes, this makes it difficult to determine where referential collections begin and end or if they overlap. For instance, on the last page of the piece (page 8), there is an octatonic scale that starts at the end of the first staff

and extends through the end of the second staff. There are two eighth note rests that seem to break up the collection at the end of the first staff and the beginning of the second staff. If these rests are ignored and only the lower note of each thirty-second note triplet is considered part of the collection, this part of the piece fits into referential collection Oct. 1. In this case register (only the lowest note of the triplet) and rhythm (thirty-second note triplets) act as criteria for segmentation. This type of subtle segmentation is consistent throughout this piece.

With these criteria, set class [012678] is one of the most consistently used set classes throughout this piece. It is presented in its entirety in every movement. In fact, it is the unifying collection that most of the melodic and harmonic material is drawn from. For instance, [012678] occurs at the end of the first movement. It begins just after the triplets on the last staff and is delineated rhythmically as sixty-fourth notes and with a quick crescendo and diminuendo (see highlighted segment). In "Fritzi," [012678] occurs at the beginning of this movement and is found in several places on page 3 (see highlighted segments). In "Heidel," [012678] occurs in four places (see highlighted segments). In "Emma-Jean," [01235678] occurs in two places (see highlighted segment). This particular collection is not exactly [012678], but [012678] is a subset of [01235678]. In "Yoda," [01236789] occurs at the end of this movement (see highlighted segment). [012678] is a subset of [01236789].

Much of the other melodic and harmonic material in this piece comes from subsets of [012678]. The first movement begins with a three-note descending figure. This figure is used at different transpositional levels throughout the first movement. This figure fits into set class [016]. [016] is a subset of [012678]. In "Fritzi," there is a four note chord at the end of the first staff that fits into set class [0167], which is a subset of [012678]. At the beginning of "Heidel,"

there are several collections in a row at the beginning of the first staff that are all members of subsets related to [012678], these subsets are [01268], [01267], and [0268]. In “Emma-Jean,” there are several segments of notes that fit into set classes [026], [012], and [0126]. These set classes are subsets of [012678]. This particular movement has several collections of notes that do not exactly fit into [012678]. This movement could be considered to be a departure or contrast to the preceding movements that are more strongly related to [012678]. “Yoda” is saturated with set class [012], which is a subset of [012678]. [016] and [026] occur in this movement too.

There are some notes that are not part of a subset of [012678] in this piece. The fourth movement is a good example. Set classes [025], [0125], and [0258] occur throughout this movement. These set classes are not exactly subsets of [012678], but they are related to subsets of [012678] by only a half step difference. This is consistent with Strauss’s chart on page 111 of our textbook. According to the chart, [026] which is a subset of [012678], is offset by a distance of only one voice-leading semitone from [025]. This is a consistent feature throughout this movement and the entire piece. Many set classes in this piece are not directly related to [012678], but they are only one voice-leading semitone away.

[012678] is a set class that has several very interesting properties according to the appendix at the back of *Introduction to Post-Tonal Theory* by Joseph N. Strauss. [012678] is a hexachord that is self-complementary. It is transpositionally and inversionally symmetrical, and it will map onto itself at T_0 and T_6 . It is inversionally symmetrical at I_2 and I_8 . Its interval vector is <420243>.

All of these properties of [012678] are in *Mundus Canis*. The self-complementary quality of this hexachord is exhibited at the beginning of the second staff of "Fritzi." The first two sixteenth-note triplets are {0, 11, 1, 7, 6, 5}. The next two triplets plus the quintuplet are {9, 8, 10, 4, 3, 2}. There is a repetition of pitch class 6 in the quintuplet. With the exception of this note, these two note collections are both members of set class [012678], and they are complements of each other. {0, 11, 1, 7, 6, 5} is transposed by T_9 to create {9, 8, 10, 4, 3, 2}. T_9 transposition creates the complete aggregate of all twelve pitch classes. This occurs again at the end of the same staff.

T_9 is a very prominent transposition throughout this piece. For instance, at the beginning of "Tammy," set [016] is transposed at T_{10} then it is transposed at T_9 twice. This treatment of [016] creates a nearly complete Oct.0 referential collection. A quick look through the rest of this movement shows that T_{10} , T_9 , and T_2 are used throughout.

The transpositions used in the first movement are a good example of what occurs throughout the entire piece. Transpositions of T_{10} , T_9 , and T_2 occur in most of the movements. These particular transpositions place [012678] and its subsets at pitch levels that have the fewest common tones. For instance, according to the interval vector <420243>, transpositions of T_1 , T_2 , T_4 , T_5 , T_6 , T_7 , T_8 , T_{10} , and T_{11} all create common tones. T_3 and T_9 create no common tones, while T_2 and T_{10} create only two common tones. T_3 is not used very often, if at all, in this piece, but T_2 , T_{10} , and T_9 are prominent. This indicates that the majority of transpositions in *Mundus Canis* create pitch collections with the fewest common tones. This indicates that all twelve pitch classes are active and it will be difficult to hear a clear tonal center in this piece.

The interval vector for [012678] contains even more information about the character of this piece. <420243> indicates that there are 4 interval class one, 4 interval class five, and 6 interval class six intervals in this piece. This means that there are more half steps, elevenths, perfect fourths, perfect fifths, and tri-tones than any other kind of interval in this piece. An analysis of some of the movements in this piece indicates that this is true. "Tammy" starts with a descending perfect fourth (-5) followed by a descending tri-tone (-6). In the middle of the second line there is a thirty-second note quintuplet figure that starts with two rests (circled with highlighter). This figure contains a descending major seventh (-11), ascending tri-tone (6), and an ascending major seventh (11). The first melodic intervals in "Fritzi" are an ascending major seventh (11) and a descending minor second (-1). There is a four note chord at the end of line one that contains, from the bottom to the top, a tri-tone (6), perfect fourth (5), and a tri-tone (6). "Heidel" starts with an ascending tri-tone (grace notes included), descending major third (-4), descending minor second (-1), descending minor second (-1), and an ascending tri-tone (6).

"Emma-Jean" is harmonically slightly different than the other movements in this piece. It begins with a descending major second (-2), descending minor third (-3). Interval class two is a part of the interval vector. Interval class 3, the descending minor third, is not a part of <420243>. This indicates that "Emma-Jean" will have a contrasting harmonic world compared to what occurs in the other movements of this piece.

Yoda conforms to interval vector <420243>. It contains a great deal of ascending and descending minor seconds. The first leap in this movement is an ascending minor sixth, then a descending minor seventh (-10), and an ascending minor seventh (10). There are a great deal

of minor seconds and major elevenths, perfect fourths and fifths, and tri-tones throughout out “Yoda.” All of these intervals are part of the interval vector for [012678]. This is a good indicate that set class [012678] encompasses much of what occurs in this movement and throughout the entire piece.

There is a set class that is even more prominent than [012678]. That is [012]. That is because this set class is the cell that makes up [012678] and many of the elements of this piece. According to “Properties and Generability of Transpositionally Invariant Sets” by Richard Cohn, transpositionally invariant set [012] is [678] in mod 6. There is evidence for this in *Mundus Canis*. For instance, most of the time that [012678] occurs, [012] occurs then it is transposed at T_6 to create the rest of set class [012678]. The last staff of “Tammy” is a good example of this. In the middle of this line (highlighted) there is a motivic cell with notes D#, F, and E. It is followed by A, B, and Bb. Both of these motivic note collections (D#, F, E and A, B, Bb) fit into [012]. Together, they create [012678]. This happens whenever [012] is transposed at T_6 ; therefore, [012] acts as a cell that generates [012678] at T_6 .

In “Fritzi,” the first motive is E, Eb, and D is transposed at T_6 to create notes Bb, A, and G#. This creates an [012678]. This is generally what happens at each occurrence of [012678]. [012] is transposed at T_6 to create [012678].

Yoda is an exception to this rule. “Yoda” is saturated with occurrences of [012], but there are few occurrences of [012678]. This is because [012] is transposed throughout this movement at T_1 and T_{11} instead of T_6 ; therefore, [012678] is not generated very often. [012678] occurs briefly at the bottom of page 7 and as a subset of [01236789] at the end of the movement. Other than this, [012] dominates “Yoda.” This means that “Yoda” has a somewhat

different sound world compared to the other movements. Yet it is still related to the other movements by set class [012]. This indicates that [012] is indeed an important cell. It is almost always present when [012678] occurs in this piece and it acts independently of [012678] in “Yoda.”

In general, [012678] creates unity between movements in *Mundus Canis*. What creates contrast within and between movements, and how is form created within each movement? In this piece each movement has an A and a B section. For example, the first movement A section is page 1. The B section starts with the last three G# notes at the bottom of page 1, and it lasts until the end of the second staff on page 2. A₁ starts at the beginning of the last line of page 2 and lasts until the *poco piu animato* at the bottom of page 2. There is a C section that begins at the *poco piu animato* and last until the end of the movement.

The B section in the first movement contains notes that are part of referential collections DIA-5, DIA0, and DIA+3. It also contains notes that are part of Oct.1. For example, the quick thirty-second note passage at the top of page 2 is DIA-5. The thirty-second note passage in the middle of the second staff of page 2 is DIA0. The harmonic section that follows DIA0 is in DIA+3. The repeated high G# notes through the string bends just before the DIA-5 thirty-second notes at the top of page 2 are in Oct.1. This is the case if only the lowest and highest notes in this section are considered to be part of the referential collection. This demonstrates how register plays an important role in segmentation. The lower two notes of the triad are not considered part of Oct.1 because they arise from purely idiomatic considerations. Basically, they are easy to play on the guitar along with the upper harmonic note, although they don't necessarily fit into the collection. The upper note of the string bend

is not considered part of the collection because it is nearly impossible to bend these particular notes any higher than a half step. This demonstrates how idiomatic considerations can play a part in what notes are included as part of the harmonic analysis. In this particular part of the piece, these notes are simply idiomatic.

The B section in the first movement is a good example of what happens consistently throughout this piece. The A sections are generally based on set class [012678] or subsets derived from it. The B sections are made up of notes from octatonic, whole tone, or diatonic collections. This means that the B sections contrast harmonic with the A sections throughout *Mundus Canis*.

“Heidel” is a good example of Crumb’s use of whole tone collections in the B section of some movements. The A section is all of staff one and it is made up of subsets of [012678]. The B section is basically all of line 2. The B section starts in WT1. It moves to an [012678] at the thirty-second notes. It returns to WT1 at *tremolo come sopra*. [012678] returns at the end of the B section. Crumb makes a smooth transition from the end of section A which is based on [012678] to the beginning of the B section by emphasizing subset [0268]. [0268] is a subset that is part of both whole tone and set class [012678].

The B section of the last movement is interesting. It starts at the bottom of page 7 with six notes just before the *scherzando*. These six notes fit into [012678]. The sixteenth notes with grace notes at the *scherzando* fit into Oct.0. The grace notes are not part of the collection because they arise from idiomatic considerations. There are two common tones between [012678] and Oct.0 at this transition. This creates a smooth transition from the end of the A section to the beginning of the B section. The next four notes are part of Oct.1. The next set of

sixteenth notes with grace notes, in the middle of the first staff of page 8, begins in WT0. The addition of the last two sixteenth notes changes this collection to AC+4. There is also a long section of Oct.1 that is highlighted in the score. This B section contains whole tone and octatonic collections. This represents the first time these two collections have been paired in this piece. The interaction of these two collections creates an acoustic collection.

“Yoda” encapsulates much of the harmonic activity that occurs in *Mundus Canis*. The only collection that it does not use is a diatonic collection. In particular, the last gesture that starts at the fortissimo marks at the end of the last line seems to contain within it the harmonic structure of the entire piece. It is set class [01236789]. [012678] is a subset of this set class. The complement of [01236789] is [0167]. [0167] is a set class that corresponds to the four note chords in the second movement (“Fritzi”). It also contains [013679] a subset of the octatonic scale. It contains [0268] a subset of the whole tone scale. Subset [01368] contains most of the notes of [013568T], the diatonic collection.

In general, the A section of each movement is related to [012678] in some way. To be specific, the notes of each movement generally fit into these set classes: I. [0124678], II. [012678], III. [012678], IV. [01235678], V. [01236789]. The B section of each movement is related to an octatonic, whole tone, or diatonic collection. The interval vectors for these collections are quite different from that of set class [012678]. The whole tone collection is <060603>. The octatonic collection is <448444>. The diatonic collection is <254361>. In contrast, [012678] is <420243>. A comparison of the interval vectors shows that the whole tone and octatonic collections contain more major and minor thirds than [012678]. The diatonic collection only contains one tri-tone, while [012678] contains six tri-tones. These differences

create contrast within each movement and help material in the B section contrast harmonically with that of the A section. At the end of each movement, there is a return to set class [012678] or its subsets. The only exception is “Fritzi.” This movement ends with a whole tone collection.

The return to set class [012678] at the end of each movement creates a smooth transition to the next movement. This connects all of the movements together and creates continuity. The different subsets of [012678] that are emphasized in each movement create enough harmonic contrast to give each movement its own character; therefore, there is continuity and contrast between and within each movement.

In conclusion, George Crumb uses set class [012678] as a unifying collection for *Mundus Canis*. [012678] is generated from cell [012] transposed at T_6 . The A section of each movement is based on [012678] or subsets of this collection. The B section of each movement is based on contrasting collections such as whole tone, octatonic, or diatonic. These collections have different interval content from [012678]. This makes them sound harmonically different from the A section in each movement; therefore, Crumb achieves continuity between movements and contrast within each movement through the use of these referential collections.