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**A catalogue of fourth spans in Bartók's "Mikrokosmos",  
Volumes IV and V**

**O'Leary, Stephen John, Ph.D.**

**City University of New York, 1993**

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A

A CATALOGUE OF FOURTH SPANS IN BARTÓK'S  
MIKROKOSMOS, VOLUMES IV AND V

by

STEPHEN O'LEARY

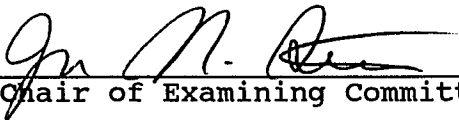
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1993

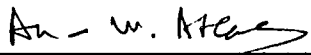
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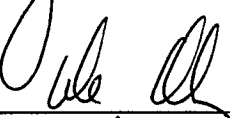
This manuscript has been read and accepted for the Graduate Faculty in Music in satisfaction of the dissertation requirement for the degree of Doctor of Philosophy.

April 23, 1993  
Date

  
Chair of Examining Committee

25 April 1993  
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## Abstract

A CATALOGUE OF FOURTH SPANS IN BARTÓK'S  
MIKROKOSMOS, VOLUMES IV AND V

by

Stephen O'Leary

Advisor: Professor Philip Lambert

In this paper, many pieces in Béla Bartók's Mikrokosmos will be shown to contain musical events bounded within the span of a perfect fourth. These spans, usually clearly indicated by phrase and articulation marks, are significant in their versatility; they can occur in diatonic pieces (under the prime form (0135)), octatonic pieces (under the prime form (0235)), pentatonic pieces ((025)), and chromatic pieces ((01235), (01245), and (012345)).

Fourth spans range in nature from conventional melodic phrases to tetrachords clashing in different "keys" ("Diminished Fifth" is the best known example of the latter process). They can also affect both harmonic structures and subtle details in musical writing (as in the B-E#-G-B cadence at the end of "Major Seconds Broken and Together").

After an introductory chapter, the paper has three chapters discussing diatonic/octatonic spans, pentatonic spans, and chromatic spans. The final chapter, "Conclusions and Conjectures," discusses the Fourth Span's possible origin and its relation to other musical works of Bartók.

## ACKNOWLEDGEMENTS

The writer would like to thank Boosey & Hawkes for its cooperation regarding the use of excerpts from the following works:

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The writer would also like to thank Philip Lambert for his advisory involvement and to thank Joel Lester, Edward Smaldone, Elliott Antokoletz, and Joseph Straus for their additional assistance.

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## CHAPTER I: INTRODUCTION

...The word Mikrokosmos may be interpreted as a series of pieces in many different styles, representing a little world.

Béla Bartók(1)

The small masterpieces [in Mikrokosmos] reveal every detail of that incredibly complicated process...when the composer consciously started to reorganize his realm of musical expression from a technical and an aesthetic point of view. He organized the twelve tones, which had been stripped of their old fetters, into a system with far more scope and complexity.

Jozsef Ujfalussy(2)

...Many of these pieces are models of structural transparency that reveal a great deal about the composer's mature compositional technique. Such features recommend these works to the teacher of musical analysis as forcefully as their pianistic features recommend them to the keyboard teacher.

Peter Child(3)

Béla Bartók's Mikrokosmos is probably best known as a work of piano pedagogy. It is also, however, a body of purely musical statements--statements often significant and sometimes profound.

In recent years, many individual pieces from Mikrokosmos have served to elucidate analytical approaches both to Bartók's music and to twentieth-century music in general. Elliott Antokoletz has used several pieces, including "Fourths" (#131) and "Syncopation" (#133), as evidence of Bartók's use of axial symmetry.(4) Richard Cohn, on the other hand, has pointed to "Whole-Tone Scale" (#136) and

"From the Island of Bali" (#109) to illustrate his concept of "transpositional combination." (5) Peter Child and Harold Lewin have analyzed Mikrokosmos pieces using Schenkerian methods. (6) Lawrence Starr has, in turn, used such pieces as "Boating" (#125) and "In Folk Song Style" (#100) to find examples of the "striking movement" of melody against the "resisting or conflicting force" of accompanying lines; (7) these incidents, he believes, "control the flow of harmonic tension and repose in the texture" and "produce a much more complex and compelling sense of tonal movement than that provided by melody alone." (8)

Richard Parks has applied the atonal set theory of Allen Forte to the well-known "Fourths," about which he writes, "it is tempting to conclude that the pianistic problem is responsible for the [harmonic] vocabulary. But the temptation must be resisted." (9) Non-tonal analysis has also interested Ivan Waldbauer, who sees a balance of "tonality and construct" in his eclectic analyses of "Free Variations" (#140), "Minor Seconds, Major Sevenths (#144), and "Divided Arpeggios" (#143). (10)

Although the interest in its individual pieces gives it the status of an important work, Mikrokosmos has rarely been discussed in its entirety (very rarely when compared, for example, to the literature concerning Bartók's String Quartets). Admittedly, an array of several score pieces composed intermittently over a 13-year period in conjunction with other works may not be an ideal subject for intense

analytical scrutiny. Some discussions approaching Mikrokosmos as a whole, however, should be mentioned.

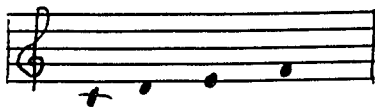
The best-known survey is Benjamin Suchoff's Guide to Bartók's Mikrokosmos, which concerns itself primarily with pianistic issues.(11) William Dustin's survey is best described by its title: "Two-voiced Textures in the Mikrokosmos of Béla Bartók."(12) In Mary E. Parker's survey, examples of pentatonicism, modes, chromaticism, and "added-note harmonization" are identified (there is a chapter on each category).(13) The principles of set theory are used by James Skoog in his survey.(14)

The compositional practice in Mikrokosmos that this writer has chosen to explore is the recurrence of musical events bounded within the span of a perfect fourth. Events of this kind occur in twenty-six of the forty-three pieces in Volumes IV and V. Their appearances are not limited to a particular compositional idiom; they are encountered in diatonic, octatonic, pentatonic, and chromatic pieces.

A fourth span, as I use the term here, is a melodic unit bounded by that interval. The number of notes within the span, the number of note-repetitions, and the order of the notes will vary with the musical context.

The fourth span shown in Example 1a, C D E F, encompasses the entire musical phrase of Example 1b, an octave-doubled unison section in "Variations on a Folk Tune" (#112). While only the first four notes of this 24-note passage state the fourth span in ascending scalar order, the

a.



b.

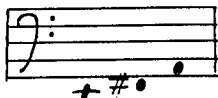


Example 1a. A literal statement of the tetrachord C D E F. Example 1b. Right hand, "Variations on a Folk Tune," mm. 1-8.

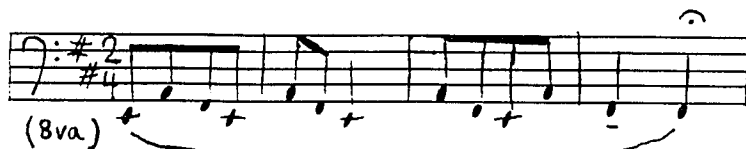
remaining twenty notes are nonetheless bounded by the span.

Example 2a shows a slightly different fourth span, one containing only one pitch between its boundary tones. That fourth span forms the basis for another octave-doubled unison section (aptly enough, one in "Unison" (#137)). The melody is full of leaps instead of steps.

a.



b.



Example 2a. Tetrachordal pitches E, F#, and A.  
Example 2b. Left hand, "Unison," mm. 13-16.

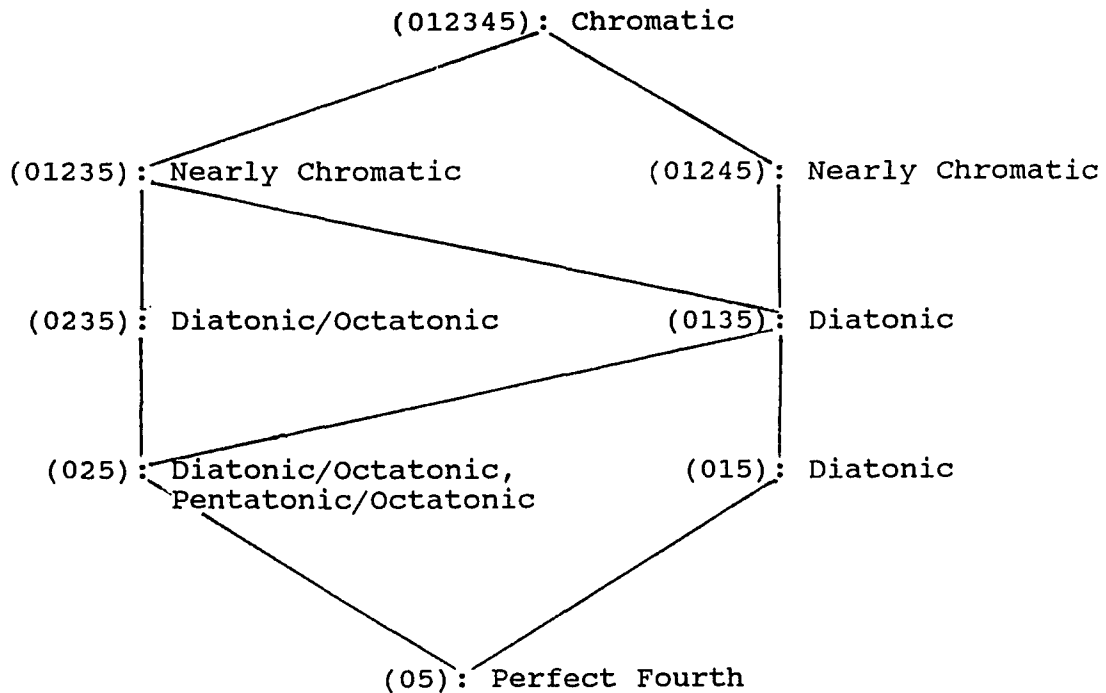
Fourth spans can be filled in various ways. Table 1 on the next page uses set-class names and prime forms to summarize all the possibilities.(15) The first numeral in each set's name signifies the number of pitches in the set, while the second numeral gives the set's ordinal number on Forte's set-class list. It should be understood that these set-class names are being applied to pitch, not pitch-class sets, and that the integers in the prime forms represents pitches, not pitch classes. The table shows the ten pitch set classes that could fill out a fourth span. Bartók does not, however, make use of all of them.

Not surprisingly, most of the fourth spans that Bartók uses in Mikrokosmos have obvious links to traditional harmonic practice. Out of the ten available set classes, the eight found in Mikrokosmos have implicit or explicit associations with familiar scales. These scales (listed with their appropriate set classes in Table 1) are the diatonic, octatonic, pentatonic, and chromatic scales. Some fourth spans consist of sets found in more than one type of scale (hence terms such as "diatonic/octatonic"). The set classes 4-4 and 4-7, which possess little tonal connotation, do not occur in Mikrokosmos. Table 2 shows the subset and superset relations among the eight "scale" fourth spans.

TABLE 1: CATEGORIES OF FOURTH SPANS

	<u>Examples</u>
2-5/(05): Perfect Fourth	C-F
3-4/(015): Diatonic	C-C#-F, C-E-F
3-7/(025): Diatonic/Octatonic, Pentatonic/Octatonic	C-D-F, C-Eb-F
4-4/(0125)	C-C#-D-F, C-D#-E-F
4-7/(0145)	C-C#-E-F
4-10/(0235): Diatonic/Octatonic	C-D-Eb-F
4-11/(0135): Diatonic	C-Db-Eb-F, C-D-E-F
5-2/(01235): Nearly-Chromatic	C-C#-D-Eb-F, C-D-D#-E-F
5-3/(01245): Nearly-Chromatic	C-C#-D-E-F, C-C#-D#-E-F
6-1/(012345): Chromatic	C-C#-D-D#-E-F

TABLE 2: FOURTH-SPAN "FAMILY TREE"



Fourth spans are articulated musically in a variety of ways, including slurs and articulation marks, held notes, and rests. The following examples from "Bagpipe" (#138) will show typical fourth-span presentations.

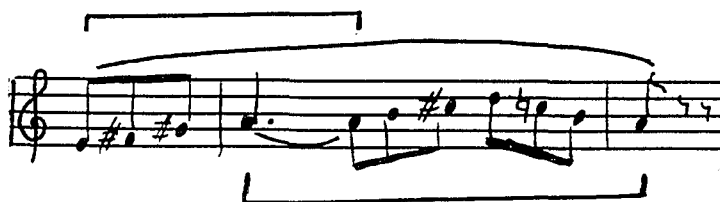
Despite the melodic line's wide range in Examples 3a and 3b, there is substantial partitioning of that line, via legato and staccato markings, into relevant fourth spans. Fourth-span groupings are even more apparent later in the piece (Example 4).

a. b.

Example 3a. "Bagpipe," mm. 7-8. Example 3b.  
"Bagpipe," mm. 10-11.

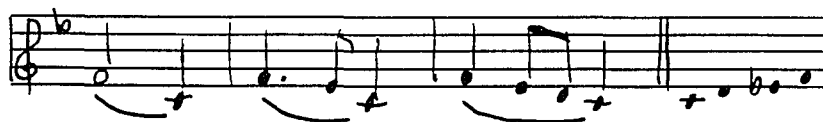
Example 4. "Bagpipe," mm. 42-45.

In certain cases within Mikrokosmos, one half of a melodic line will consist of one fourth span while the other half will consist of a different span. The use of a sustained note in the middle of the phrase, however, often articulates the spans to a satisfactory degree (Example 5).



Example 5. Right Hand, "Triplets in 9/8 Time" (#118), mm. 9-11.

Other pieces in Mikrokosmos present more serious problems in identifying fourth spans. "Hands Crossing" (#99) is a piece that, like "Diminished Fifth" (#101), splits the Octatonic Scale between two hands. It has some distinct fourth spans, as shown in Example 6.



Example 6. Right Hand, "Hands Crossing," mm. 9-11.

Other phrases in the piece, however, suggest the fourth span instead of stating it. In Example 7, the pitch B disrupts a possible C-F span.



Example 7. Right Hand, "Hands Crossing," mm. 5-8 and possible tetrachordal pitches.

A similar problem exists in "Theme and Inversion" (#114). Literal statements of diatonic tetrachords exist in

this piece (Example 8a), but other phrases (Example 8b) present the same problem as seen in Example 7. Traditional harmonic practice is obviously of greater significance in this piece than independent fourth spans.

a.



b.



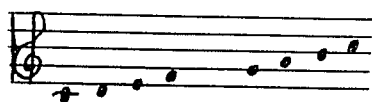
Example 8a. Right Hand, "Theme and Inversion," mm. 8-9. Example 8b. Right Hand, "Theme and Inversion," mm. 3-4 with possible tetrachordal pitches.

Many other examples of "near-fourth spans" exist in Mikrokosmos. Are they genuine fourth spans with "non-span" pitches? It would be possible to make fourth-span criteria less exclusive and, with the inclusion of neighbor notes, more compatible with traditional tonality. Enough examples of "strict" fourth spans, however, already exist. Furthermore, as the following chapters will show, many of these spans have distinctive non-tonal characteristics.

## CHAPTER II: The DIATONIC AND DIATONIC/OCTATONIC FOURTH SPANS

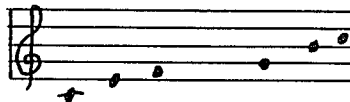
The tetrachords that comprise the Diatonic and Diatonic/Octatonic Fourth Spans (prime forms (0135), (015), and (0235) respectively) can be combined to form diatonic scales. Example 9 shows the process for (a and b) the Major Scale, (c) the Phrygian Mode, and (d) the Dorian Mode.

a.



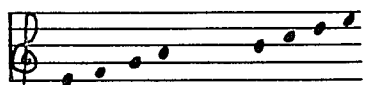
(0135) (0135)

b.



(015) (015)

c.



(0135) (0135)

d.



(0235) (0235)

## Example 9.

Diatonic fourth spans can be seen in Mikrokosmos as early as Volume II, with "Crescendo-Diminuendo" (#49) serving as a specific example. The earliest piece in the published Mikrokosmos to "modulate" (in other words, to state the dominant/tonic cadences of different keys), "Crescendo-Diminuendo" starts with four literal tetrachord statements that clearly indicate the tonal progression I-IV-V/V-V (Example 10). The subsequent four-note phrases are fourth spans as well. All the bracketed spans represent the pitch set at (0135).



Example 10. "Crescendo-Diminuendo," mm. 1-4.

Other examples of diatonic fourth spans in Volume II can be seen in "In Transylvania Style" (#53), "Accents" (#57), and "Dialogue" (#65). It is not until Volumes IV and V, however, that Diatonic/Octatonic Fourth spans follow courses different from the melodic and harmonic practices associated with diatonicism.

The fourth spans in "Change of Time" (#126), derived from the Mixolydian mode on C, significantly influence harmonic structure. As Examples 11a and 11b show, the range, choice and direction of accompanying pitches--especially in the use of parallel intervals--conform to the fourth spans present in the melody. While what might be interpreted as a chromatic fourth span exists in the left hand, its structural significance is clearly subordinate.

The diatonic and diatonic/octatonic fourth spans in "Change of Time" are typical of spans that incorporate leaps of a third. Many other diatonic and diatonic/octatonic fourth spans, however, express their component tetrachords in stepwise motion, usually as literal statements. "Variations on a Folk Tune" (#112) contains a prominent example of such a

## a. (Diatonic)

## b. (Diatonic/Octatonic)

Example 11a. "Change of Time," mm. 1-4.

Example 11b. "Change of Time," mm. 21-22.

technique. In the final section of "Variations," fourth spans determine units of phrase length and, through parallel lines, a large portion of the piece's harmony as well. As can be seen in Example 12, literal tetrachord statements make up the section's melody. The chords are the result of an organum-like layering of parallel musical lines, and dissonances are not avoided.

All of the bracketed spans in Example 12 represent (0135) or (0235), except for the two marked with a question mark. Technically, these are not really fourth spans at all, as they span a tritone, not a perfect fourth. Nevertheless, an augmented fourth and a perfect fourth do contain the same number of scale degrees, and given the parallelisms that

The image shows two systems of handwritten musical notation. Each system consists of a treble clef staff and a bass clef staff. The notation includes various rhythmic values, accidentals, and brackets indicating spans. A question mark is placed above the second measure of the first system and below the second measure of the second system.

Example 12. "Variations on a Folk Tune," mm. 45-50.

pervade the passage, a slight extension of analytical category may be permitted in this instance.

The following three pieces illustrate the significance of diatonic and diatonic/octatonic fourth spans in three other formats: an accompanied melody, a span interacting with specific non-span pitches, and a span interacting with another span.

"Intermezzo" (#111) is an interesting showcase of both separate and merging melodic units. In Example 13, the same fourth-span-by-steps is associated with different "non-span" accompaniments.

Example 13. "Intermezzo," mm. 37-43.

Even melodic phrases with larger spans than a fourth in "Intermezzo" have the stylistic traits of the fourth span. In Example 14, a phrase with an overall E-B span starts out with a diatonic E-A span and then jumps to an F#-B span (a similar process occurs in "Diminished Fifth" (#101) at mm. 31-32).

Example 14. Left Hand, "Intermezzo," mm. 1-4.

"Chords Together and Opposed" (#122) has its musical

action controlled by step-oriented diatonic fourth spans. The harmonic technique used in "Variations on a Folk Tune" (in its reverse form of contrary motion) is now employed along with pedal pitches. Example 15 shows a fourth span that moves between two pedal lines (these pedal lines are a fifth or fourth apart throughout the piece).

Example 15. "Chords Together and Opposed," mm. 1-3.

As can also be seen in Example 15, the lower right-hand pedal is the pitch G and the diatonic span utilizes the tetrachord G-A-B-C. Span and pedal frequently intersect, as in m. 3.

The tetrachords evident in "Diminished Fifth" (#101) have already been noticed by several authorities, including Antokoletz(16) and Parker(17). Especially relevant are the observations of Joel Lester, (18) who stresses the non-tonal aspects of diatonic/octatonic tetrachords, each with "its own tonal or modal flavor," separated by the eponymous diminished fifth. The sustained harmonic intervals in this piece are usually determined by the lowest and highest pitches of its component fourth spans (Example 16).



Example 16a. "Diminished Fifth," mm. 1-5.

Fourth spans, in a form different from the step-oriented versions seen in Example 16, determine melodic variations later in the piece (as will be discussed later in the study).

The following is a complete list of diatonic (0135) and diatonic/octatonic (0235) fourth spans in Volumes IV and V of Mikrokosmos. For each excerpt, I have shown measure numbers and the "boundary" pitches of each span.

TABLE 3: APPEARANCES OF DIATONIC AND DIATONIC/OCTATONIC FOURTH SPANS IN MIKROKOSMOS, VOLUMES IV AND V

97--"Notturmo" (Diatonic/Octatonic, Diatonic (015)):  
mm. 3-8, E-A; mm. 14-15, E-A; mm. 17-18, F#-B; mm. 19-20, D-G; mm. 21-22, B-E; mm. 28-29, E-A; mm. 32-33, E-A.

99--"Hands Crossing" (Diatonic/Octatonic):  
mm. 9-11, C-F; mm. 15-16, F#-B; mm. 19-20, F#-B; mm. 20-23, C-F (Perfect Fourths); mm. 21-22, F#-B; m. 22, F#-B.

101--"Diminished Fifth" (Diatonic/Octatonic, Diatonic):  
mm. 1-3, Eb-Ab & A-D; mm. 3-5, Eb-Ab & A-D; mm. 6-8, Eb-Ab; mm. 6-9, A-D; mm. 8-11, Eb-Ab; mm. 9-11; A-D; mm. 20-22, Eb-Ab; mm. 21-22, A-D; mm. 22-23, Eb-Ab; mm. 22-24, A-D; mm. 22-23, Eb-Ab; mm. 23-25, Eb-Ab; mm. 24-25, A-D; mm. 26-29, F-Bb(?) (last note Eb); mm. 26-27, B-E; mm. 27-29, B-E; mm. 29-30, A-D; mm. 30-31, G-C; mm. 31-32, Db-Gb/Bb-Eb; mm. 32-33, E-A; mm. 35-37, Eb-Ab; mm. 36-38, A-D; mm. 37-39, Eb-Ab, mm. 38-39, A-D; mm. 39-41, Eb-Ab; mm. 40-44, A-D; mm. 41-44, Eb-Ab.

103--"Minor and Major" (Diatonic/Octatonic):  
mm. 21-22, A-D.

106--"Children's Song" (Diatonic, Diatonic/Octatonic):  
mm. 3-4, C-F; mm. 5-6, D-G; mm. 11-12, F#-B, mm. 12-13, D-G;  
mm. 13-14, E-A; mm. 15-16, E-A, mm. 17-19, E-A(?) (pitches  
E, F#); mm. 27-28, D-G; mm. 29-30, F#-B; mm. 31-32, E-A;  
mm. 33-35, E-A.

111--"Intermezzo" (Diatonic, Diatonic/Octatonic):  
mm. 14-17, E-A; mm. 15-17, A-D; mm. 21-22, D-G; mm. 22-23,  
G-C, mm. 25-26, E-A; mm. 32-34, D-G; mm. 37-40, E-A;  
mm. 41-43, E-A; mm. 47-51, E-A/F#-B(?); mm. 50-52, B-E.

112--"Variations on a Folk Tune" (Diatonic, Diatonic/  
Octatonic):  
mm. 1-8, C-F; mm. 9-16, C-F & E-A; mm. 10-17, F-B & A-D;  
mm. 17-18, F-B & A-D; mm. 18-19, F-B & A-D; mm. 19-20,  
E-A & G-C; mm. 20-21, E-A & G-C; mm. 21-22, D-G & F-B;  
mm. 22-23, D-G & F-B; mm. 23-24, E-A & G-C; mm. 24-25,  
B-E & D-G; mm. 25-26, B-E & D-G; mm. 26-27, F-B & A-D &  
E-A & G-C; mm. 27-28, B-E & D-G; mm. 45-46; C-F & E-A;  
mm. 46-47, F-B & A-D; mm. 47-48, E-A & G-C; mm. 48-49,  
A-D & C-F; mm. 49-50; A-D & C-F; mm. 50-51; D-G & F-B;  
mm. 51-52, C-F & E-A; mm. 53-55, C-F & E-A; mm. 56-57,  
C-F & E-A; mm. 58-59, D-G & F-B.

114--"Theme and Inversion" (Diatonic):  
mm. 1-2, A-D; m. 5, B-E; mm. 5-6, A-D; m. 7, C#-F#; mm. 7-8,  
B-E; m. 8, F#-B (three times); mm. 8-9, E-A; mm. 9-10, A-D;  
m. 14, G#-C# & F#-B; mm. 14-15, E-A; m. 18, A-D; mm. 18-19,  
F#-B.

117--"Bouree" (Diatonic/Octatonic):  
m. 1, A-D; m. 5, E-A; mm. 8-10, A-D (015).

118--"Triplets in 9/8 Time" (Diatonic):  
mm. 9-10, E-A; mm. 13-14, B-E; mm. 21-22, F-B(?); m. 22,  
F-B(?); m. 22, G-C, mm. 22-23, Gb-C(?); m. 23, Ab-Db; m. 23,  
G-C#(?); mm. 23-24, A-D.

120--"Triads" (Diatonic, Diatonic/Octatonic):  
mm. 3-4, F-Bb; mm. 31-33, A-D.

122--"Chords Together and Opposed" (Diatonic, Diatonic/  
Octatonic):  
mm. 1-12, G-C; mm. 13-26, G-C; mm. 27-30, E-A; mm. 31-34,  
E-A; mm. 35-39, E-A; mm. 39-48, E-A; mm. 49-51, A-D; mm. 50-  
52, B-E; mm. 52-54, A-D; mm. 57-61, A-D.

123(a)--"Staccato and Legato" (Diatonic):  
mm. 20-21, C-F; mm. 22-23, Gb-Cb; mm. 23-25 C-F.

124--"Staccato" (Diatonic, Diatonic/Octatonic)

mm. 9-10, G-C/A-D? (in same phrase); m. 25, C#-F#.

125--"Boating" (Diatonic/Octatonic):

m. 20, B-E; mm. 20-21, A-D; mm. 21-22, A-D, mm. 22-23, A-D.

126--"Change of Time" (Diatonic, Diatonic/Octatonic):

mm. 1-4, F-Bb; mm. 5-8, E-A; mm. 9-12, F-Bb, mm. 13-16, E-A;  
mm. 21-22, D-G; mm. 23-24, C-F; mm. 25-26, D-G.

128--"Peasant Dance" (Diatonic/Octatonic, Diatonic):

mm. 7-8, Bb-Eb; mm. 51-52, G-C.

129--"Alternating Thirds" (Diatonic, Diatonic/Octatonic):

mm. 27-30, A-D; mm. 30-31, D-G (& B-E); mm. 31-33, A-D;  
mm. 33-34, F#-B; mm. 34-36, B-E (& G-C).

131--"Fourths" (Diatonic, Diatonic/Octatonic):

mm. 1-4; Eb-Ab & Bb-Eb; mm. 5-8, Eb-Ab & Bb-Eb; mm. 18-20,  
F-Bb & C-F.

138--"Bagpipe" (Diatonic, Diatonic/Octatonic):

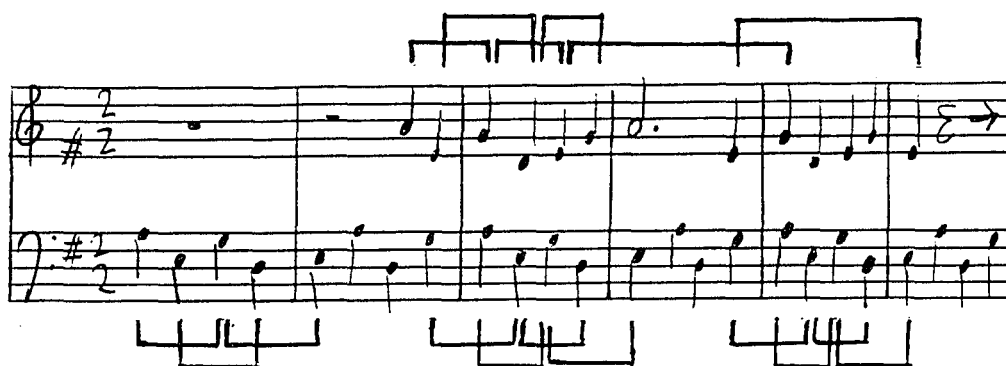
m. 4, D-G; m. 7, D-G; mm. 7-8, G-C ((015)); m. 10, D-G  
(Perfect Fourth); mm. 10-11, A-D; m. 16, D-G; m. 19, D-G;  
mm. 19-20, G-C ((015)); m. 22, D-G (Perfect Fourth); mm. 22-  
23, A-D; mm. 30-31, A-D; m. 33, A-D; m. 40, C-F & B-E;  
m. 41, A-D; m. 42, C-F & B-E; 43, A-D; mm. 43-44, B-E/D-G; m.  
44, C-F; m. 45, B-E & A-D; m. 52, D-G; m. 56, C-F; m. 57,  
D-G; mm. 57-58, G-C ((015)); m. 62, D-G (Perfect Fourth); mm.  
62-63, A-D; m. 66, A-D.

## CHAPTER III: The PENTATONIC/OCTATONIC FOURTH SPAN

((025)/(035))

A Pentatonic Scale contains non-scalar rather than scalar fourth spans. These spans are filled by three pitches instead of four. For example, a diatonic/octatonic fourth span with a "boundary" interval of C-F could be C D E F, C Db Eb F, or C D Eb F, while a "C-F" pentatonic/octatonic fourth span could be C D F or C Eb F. Prolonged step motion is impossible with a pentatonic/octatonic fourth span; in fact, the leap of a fourth is often a salient feature.

Pentatonic/Octatonic fourth spans, particularly those featuring the leap of a fourth, may be found as early as Volume II of Mikrokosmos. In the "tetratonic" "County Fair" (#47), the four-pitch melody can be understood as a continuous succession of intersecting fourth spans. For example, the first three spans in the melody of Example 17 are A E G, E G D, and G D E. The ostinato (also derived from the pitch set D E G A), while not being as consistent in its fourth-span appearances, does have its share of them (its first three spans are also A E G, E G D, and D G E). While fourth spans may not be the primary structures of this piece, their presence creates at least a stylistic link to other pieces in Mikrokosmos.



Example 17. "County Fair," mm. 1-6.

Pentatonic/Octatonic spans can also be found in "Minor and Major" (#103), "Game (with two five-tone scales)" (#105), "Unison" (#137), and "New Hungarian Folk Song" (#127). In "Minor and Major," there are two sections (mm. 5-14 and mm. 33-39) in which the initial point of interest is the rapid and repetitive alternation between A major and A minor. The repetition of the harmonic idea, however, also stresses linearity. The major/minor intervals arise from two parallel lines divided into structural fourth spans, as can be seen in Example 18.



Example 18. "Minor and Major," mm. 4-6.

When structural fourth spans again appear, the two lines

containing them are more ostinato-like and are no longer strictly parallel, as can be seen in Example 19. Both hands, however, still contain a discernible similarity to Example 18.

Example 19. "Minor and Major," mm. 33-34.

The title "Game (with two five-tone scales)" suggests a harmonic language distinctly different from that of "Minor and Major". The structural spans found in "Minor and Major," however, reappear. In the passage in Example 20, each four-note figure contains two fourth spans of the (025)/(035) type.

Example 20. "Game," mm. 1-3.

The fourth spans appearing in Example 21 are more noticeable when one disregards the pedal-like B and G# (in the right hand and left hand respectively) and then examines the two remaining musical lines (isolated at the end of the example). The pitch content of each defines a fourth span: D E G in the right hand and C# D# F# in the left.

Example 21. "Game," mm. 42-44.

The two pieces just discussed show different approaches to utilizing the fourth spans. In "Minor and Major," the fourth spans develop out of a line that is first scalar (as can be seen in mm. 1-2 of Example 22a), then arpeggiated (mm. 3-4), and finally compressed into fourth spans (mm. 4-5). "Game," on the other hand, starts off with fourth spans (Example 22b, mm. 1-3) and then has its lines expand into broader spans (mm. 3-4). The fourth spans function within a diatonic framework in "Minor and Major" and within a pentatonic framework in "Game."

a.

b.

Example 22a. "Minor and Major," mm. 1-5.

Example 22b. "Game," mm. 1-4.

The fourth spans in "Unison" are linked particularly closely to pentatonicism. Three fourth-span intervals are used in the piece (E-A, A-D, and F#-B), and much is done within those boundaries. Melodic elaborations can be seen in Example 23, where a relatively short fourth span employing the interval E-A (mm. 50-51) is followed by a more complex fourth span using both E-A and F#-B (mm. 51-52), and then

return to E-A (m. 53).

Example 23. "Unison," mm. 48-53.

Fourth spans do not play so obvious a role in "New Hungarian Folk Song." The accompaniment in this piece uses no fourth spans whatsoever. While the vocal line is admittedly based more on overall pentatonicism and axial relations between sub-phrases, it nonetheless can be parsed into fourth spans (Example 24).

"Minor and Major," "Game," "Unison," and "New Hungarian Folk Song" are similar in that their pentatonic/octatonic fourth spans are not obvious or pervasive surface structures. There are many other pieces in Mikrokosmos, however, that are thoroughly permeated by fourth spans.



Example 24. Vocal Line, "New Hungarian Folk Song"  
(text omitted), mm. 3-7.

In "Diminished Fifth" (#101), for example, (025) and (035), subsets of the diatonic/octatonic set (0235), are ubiquitous (Example 25).(19).



Example 25. "Diminished Fifth," mm. 12-15.

"Children's Song" (#106), "Boating" (#125), and "Peasant Dance" (#128) are similarly permeated with fourth spans (Example 26). "Peasant Dance" is almost traditionally tonal; "Children's Song" incorporates distinctive dissonances; "Boating" flirts with bitonality.

a.

b.

c.

Example 26a. "Children's Song," mm. 1-3.

Example 26b. "Boating," mm. 39-42.

Example 26c. "Peasant Dance," mm. 28-31.

A complete list of pentatonic/octatonic fourth spans follows in Table 4.

TABLE 4: APPEARANCE OF PENTATONIC/OCTATONIC FOURTH SPANS IN  
MIKROKOSMOS, VOLUMES IV AND V

101--"Diminished Fifth:"

mm. 12-15, Db-Gb; mm. 12-14, G-C; mm. 14-15, G-C; mm. 16-18, Bb-Eb; mm. 16-17, E-A; mm. 17-19, E-A.

103--"Minor and Major:"

mm. 4-5, B-E; mm. 4-8, A-D; mm. 5-8, C#-F#; mm. 10-12, B-E; m. 19, C#-F#; m. 23, C#-F#; mm. 32-33, B-E/C#-F# (repeated six times through mm. 33-39); m. 33, A-D/B-E (repeated six times through mm. 34-39).

105--"Game (with two five-tone scales):"

mm. 1-2, D#-G#/C#-F#; mm. 2-3, E-A/D-G; m. 10, E-A/D-G & C#-F#/D#-G#; m. 13, E-A/D-G & C#-F#/D#-G#; mm. 17-18, E-A/D-G & C#-F#/D#-G#; mm. 39-40, D#-G#/C#-F#; mm. 40-41, E-A/D-G; mm. 42-43, D-G; mm. 42-43, C#-F#; m. 43, D-G; m. 43-44, C#-F#; m. 44, D-G; m. 44, C#-F#? (notes F# & D#).

106--"Children's Song:"

m. 1-4, E-A; mm. 1-3, C-F; mm. 4-8, E-A? (penultimate note G#); mm. 16-17, C-F; mm. 19-20, C#-F#; mm. 20-21, A-D(?) (last note C#); mm. 37-38, F#-B; mm. 38-39, D-G.

124--"Staccato":

m. 24, G-C.

125--"Boating:"

mm. 22-23, Eb-Ab; m. 39, Ab-Db; m. 41, Db-Gb; mm. 41-42, F-Bb(?) (last note E); m. 42, Ab-Db; mm. 45-46, Ab-Db.

127--"New Hungarian Folk Song:"

mm. 3-4, B-E/E-A/B-E; mm. 5-7, F#-B/E-A/F#-B; mm. 8-10, F#-B/E-A/F#-B/E-A; mm. 11-12, B-E/E-A/B-E; mm. 16-17, B-E/E-A/B-E; mm. 18-20, F#-B/E-A/F#-B; mm. 21-23, F#-B/E-A/F#-B/E-A; mm. 24-25, B-E/E-A/B-E.

128--"Peasant Dance:"

mm. 5-6, G-C; mm. 9-10, Eb-Ab; mm. 13-14, G-C; mm. 28-30, C-F; mm. 29-31, Ab-Db; mm. 32-34, Ab-Db; mm. 33-35, F-Bb.

129--"Alternating Thirds:"

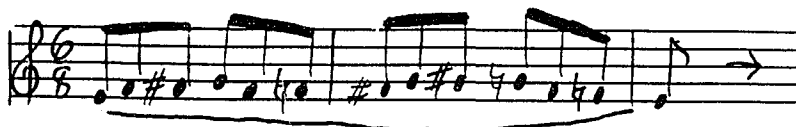
mm. 1-3, A-D; mm. 7-9, A-D.

137--"Unison:"

m. 6, E-A; m. 12, E-A; mm. 13-16, E-A; m. 24, E-A; mm. 35-38, A-D; m. 44, A-D; mm. 50-52, E-A/F#-B; mm. 53-54, E-A.

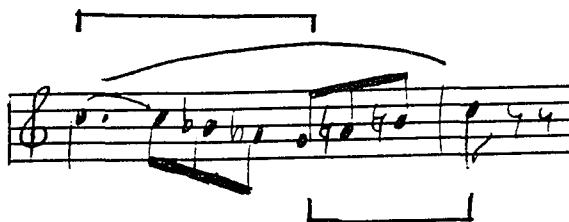
## CHAPTER IV: The NEARLY-CHROMATIC AND CHROMATIC FOURTH SPANS

Chromatic-scale fragments are present even in the early volumes of Mikrokosmos. Their durations and interval spans, however, are both limited.



Example 27. Right Hand, "Chromatics" (#54 (Volume II)), mm. 1-3.

Indeed, many chromatic scale fragments describe either the Nearly-Chromatic ((01235) and (01245)) Fourth Span or the Chromatic ((012345)) Fourth Span. In some instances, these fourth spans can be understood as elaborations of an underlying diatonic fourth span. For instance, the total span in Example 28, G Ab A Bb B C, is divided into two diatonic spans, G Ab Bb C and G A B C.



Example 28. Right Hand, "Triplets in 9/8 Time" (#118), mm. 27-28.

Diatonic divisions, however, are not always the rule. Sometimes, changing the order of only two pitches eliminates a potential chromatic glissando. This can be observed in the sectional "cadence" shown in Example 29.

Example 29. "And the Sounds Clash and Clang" (#110),  
mm. 26-30.

At other times, the complete filling of the chromatic tetrachord is deliberately delayed. This is especially true in several of the less tonal Mikrokosmos pieces. In Example 30, the first span is nearly-chromatic; the second span, while fully chromatic, does not immediately use all its available pitches. Specifically, the pitch B $\flat$  is avoided until an "arch" has already been executed.

Example 30. "Staccato" (#124), mm. 4-6.

Two pieces, "Major Seconds Broken and Together" (#132) and "Staccato and Legato" (#123(a)), make extensive use of

chromatic fourth spans. The last two spans in "Major Seconds Broken and Together" can be observed in Example 31.

In this example, the right hand utilizes the span F# G G# A A# B. A chromatic span can be found in the left hand as well. In the final chord, the left hand moves past its expected boundary of E to E#. Since the latter pitch is combined with B and G in the last chord, one would think that "F" would be a more suitable spelling (especially in light of the piece's tonal center of G). "E#" indicates a significant use of orthography; perhaps Bartók, in making this exception to the pitch-range rule of this piece, was attempting to reconcile a desire to maintain fourth spans and an overriding need to let a particular cadence take place.

The image shows a musical score for two staves. The top staff is in treble clef and the bottom staff is in bass clef. Both staves have a key signature of one sharp (F#). The music consists of several measures. In the top staff, a bracket spans from the first measure to the fourth measure, highlighting a chromatic fourth span: F# (quarter), G (quarter), G# (quarter), A (quarter). In the bottom staff, a bracket spans from the first measure to the fourth measure, highlighting a chromatic fourth span: F# (quarter), G (quarter), G# (quarter), A (quarter). The final measure of the piece shows a cadence with notes F# (quarter), G (quarter), G# (quarter), A (quarter) in the top staff and E# (quarter), F# (quarter), G (quarter), A (quarter) in the bottom staff.

Example 31. "Major Seconds Broken and Together,"  
mm. 22-24.

In "Staccato and Legato," diatonic subsets of a chromatic fourth span (in Example 32, C D E F and G A B C) can again be discerned. The chromatic spans are placed in a way that emphasizes vertical tritones--a process similar to

the structure of "Diminished Fifth."

Example 32. "Staccato and Legato," mm. 1-4.

A full catalogue of nearly-chromatic and chromatic fourth spans can be seen in Table 5.

TABLE V: APPEARANCE OF NEARLY-CHROMATIC AND CHROMATIC FOURTH SPANS IN MIKROKOSMOS, VOLUMES IV AND V

- 108--"Wrestling" (Chromatic, Nearly-Chromatic)"  
m. 12-13, E-A; mm. 13-15, E-A; mm. 16-17, D-G.
- 110--"And the Sounds Clash and Clang" (Chromatic):  
mm. 29-30, B-E; mm. 56-57, E-A.
- 117--"Bouree" (Nearly-Chromatic):  
mm. 6-7, E-A; mm. 10-11, G-C; m. 11, G-C; mm. 12-13, A#-D#.
- 118--"Triplets in 9/8 Time" (Nearly-Chromatic, Chromatic):  
mm. 7-8, Bb-Eb; m. 8, F-Bb; mm. 10-11, A-D; mm. 14-15, F#-B;  
mm. 25-26, G-C; mm. 26-27, G-C; mm. 27-28, G-C & G-C (different octaves); mm. 32-33, C-F.
- #123(a)--"Staccato and Legato" (Chromatic):  
mm. 1-3, C-F; mm. 2-4, G-C; mm. 4-6, C-F; mm. 5-7, G-C;  
mm. 13-15, C-F; mm. 13-16, F-Bb; mm. 16-17, C-F; mm. 16-18, F-Bb;  
mm. 18-19, C-F; mm. 18-20, F#(Gb)-B.
- 124--"Staccato" (Chromatic, Nearly-Chromatic):]  
mm. 2-4, A-D; mm. 4-6, A-D, mm. 10-11, A#-D# ((015)); m. 11, Eb-Ab(G#) ((015)); mm. 11-12, A#-D#; mm. 14-15, Eb-Ab; mm. 24-25, G-C ((015)); mm. 26-27, A-D ((015)); mm. 27-28, A#-D# ((015)); mm. 29-30, A-D ((015)); m. 30, A#-D# ((015)); mm. 31-32, A-D ((015)); m. 32, A#-D# ((015)).

126--"Change of Time" (Nearly-Chromatic):  
mm. 1-4, D-G.\*

131--"Fourths" (Nearly-Chromatic):  
mm. 22-30, Eb-Ab & Bb-Eb.

132--"Major Seconds Broken and Together" (Chromatic,  
Nearly-Chromatic):  
mm. 1-2, B-E; m. 6, D-G; mm. 11-12, C-F; mm. 13-14, C-F;  
mm. 19-20, B-E; mm. 20-22, B-E#(?); mm. 22-24, F#-B &  
B-E#(?).

\* Runs parallel (and is subordinate) to a diatonic fourth  
span.

## CHAPTER V: CONCLUSIONS AND CONJECTURES

The Fourth Span is distinct but adaptable to different musical contexts. In itself, the Fourth Span may be reminiscent of traditional tonal practice. It is not, however, often used in a traditional tonal context.

Where did the idea of using the Fourth Span originate? Bartók was deeply interested in the folk music of Eastern Europe and several relevant pieces in Mikrokosmos have "folk" titles ("Peasant Dance," "New Hungarian Folk Song," etc.). One might guess that the inspiration for the Fourth Span came directly from folk sources. If the Fourth span has a folk origin, however, this origin is a distant one. Actual quotation of folk music is rare in Mikrokosmos, and, of course, many of the pieces are profoundly non-folk-like in construction. (20)

Although the exact origin of the fourth span remains uncertain, such spans can be found in Bartók's other works. A comparison worth pursuing is that between the chronology of fourth-span use during the creation of Mikrokosmos and the incidents of fourth spans in non-Mikrokosmos pieces composed during the same period.

When John Vinton devised a chronology for Mikrokosmos, he relied on physical proofs such as manuscript paper, ink, correspondence, and performance programs. (21) Vinton's ordering of the pieces, however, reveals some unexpected musical results. For example, the structurally similar

"Diminished Fifth," "Children's Song," and "Boating" (discussed in Chapter III) were all written during the same compositional period in 1932. "Minor and Major" and "Game" (discussed in Chapter IV) were both composed in 1933. Perhaps the most striking discovery, however, is the pattern that appears when one reads the following table.

TABLE 6: PIECES IN VINTON'S CHRONOLOGY  
UTILIZING FOURTH SPANS

1926-1932

"Unison" (only Volume IV/V piece)

1932

"Diminished Fifth," "Children's Song," "And the Sounds Clash and Clang," "Intermezzo," "Theme and Inversion," "Boating," "Major Seconds Broken and Together" (7 out of 9 Volume IV/V pieces)

1933

"Major and Minor," "Game (with two five-tone scales)," "Wrestling," "Chords Together with Opposed," "Staccato" (5 out of 6 Volume IV/V pieces)

1934

"Hands Crossing," "Variations on a Folk Tune," "Bouree," "Triplets in 9/8 Time," "Fourths" (5 out of 5 Volume IV/V pieces)

1935-36

"Staccato and Legato," "Alternating Thirds" (2 out of 3 Volume IV/V pieces)

1937

"Triads," "Bagpipe" (2 out of 5 Volume IV/V pieces)

1938-39

"Notturmo," "Change of Time," "New Hungarian Folk Song," "Peasant Dance" (4 out of 13 Volume IV/V pieces)

1939

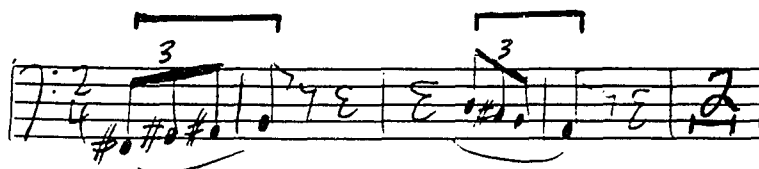
none (1 Volume IV/V piece)

As can be seen in Table 6, a rough bell-curve occurs according to the proportion of pieces in which fourth spans

occur. These proportions, from the second earliest time period to the latest, would be listed as 77%, 83%, 100%, 67%, 40%, 31%, and 0%. Apart from the earliest period, where the single relevant pieces has fourth spans, the earlier periods build up to a peak use of fourth spans, and the later periods drop off. Furthermore, fourth spans occur more frequently as Bartók's other works become more innovative and less frequently during the later, more traditional periods of his compositional career. This apparent association is reinforced by the structural aspects of two important works composed at the same time as Mikrokosmos.

The Fifth String Quartet was completed in 1934; all of the pieces of Volumes IV and V composed in that same year have some evidence of fourth spans. As if in solidarity, there are significant appearances of fourth spans in the last movement of the quartet. János Kárpáti has described the passages shown in Example 33 as being based on "tetrachordal units"(22)--terminology very similar to that of this study. The phrasing of Example 33a is especially striking when compared to a passage (admittedly containing some inconvenient augmented fourth spans) in "Triplets in 9/8 Time" (#118), composed in the same year as the quartet (Example 34). Kárpáti himself compares the 5th movement section in Example 43b to "Peasant Dance,"(23) a piece discussed in Chapter III.

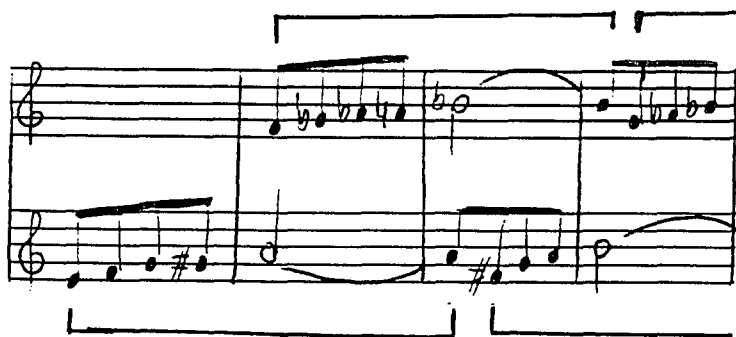
a.



||



b.



||

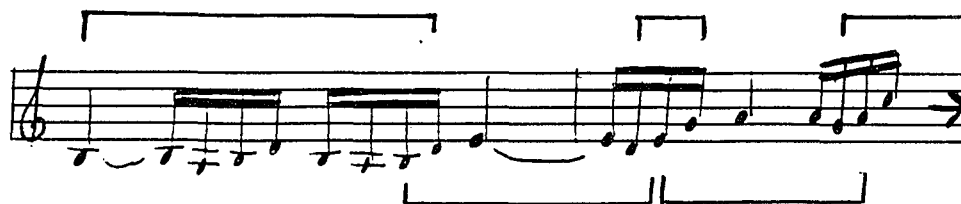


Example 33a. Cello, Fifth String Quartet, 5th Movement, mm. 1-10. Example 33b. 1st and 2nd Violins, Fifth String Quartet, 5th Movement, mm. 274-281.



Example 34. "Triplets in 9/8 Time," mm. 21-24.

The Second Violin Concerto was completed in 1938, a year in which a relatively low proportion of Mikrokosmos pieces were composed with fourth spans. The concerto reinforces this trend when compared to the Fifth Quartet. While fourth spans are present, their appearances are very sporadic (Example 35).

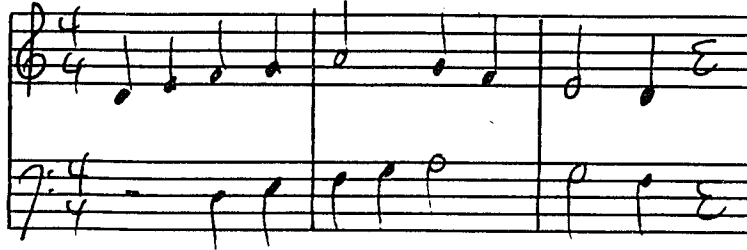


Example 35. Solo part, Second Violin Concerto, First Movement, mm. 220-221.

As a final conjecture, let us narrow the field of "Bartók's other works" to the volumes in Mikrokosmos not previously discussed. The overwhelming majority of fourth spans in Mikrokosmos appear between the distinctly simpler pieces of Volumes I through III and the difficult pieces of Volume VI. Where fourth spans are absent, however, structures based on a different interval span may exist.

The easiest pieces in Mikrokosmos are built not on an

interval span per se, but on the almostly brutally empirical span of five fingers (Example 36).



Example 36. "Imitation and Inversion (1)" (#23),  
mm. 1-3.

Several pieces in Volume VI, on the other hand, including "Free Variations," "Subject and Reflection," "From the Diary of a Fly," "Divided Arpeggios," "Minor Seconds, Major Sevenths," and "Chromatic Invention" (#140-145), largely abandon the Fourth Span as they go to the frontiers of tonal composition. (24) Even under such circumstances, however, two Volume VI pieces operate through structures analogous to the Fourth Span.

"Subject and Reflection" has a finite span and pitch repository for each passage. The passage in Example 37 shows each voice operating within the span of a fifth. The spans are based on pitch collections with a set-class prime form of 02357)).

The densely chromatic "From the Diary of a Fly" has a similar property. Many distinct passages occur within set spans, usually seconds and thirds (Example 38).

Example 37. "Subject and Reflection," mm. 1-3.

Example 38. "From the Diary of a Fly," mm. 1-8.

While the Fourth Span is largely confined to Volumes IV and V, interval spans of other sizes have been shown to exist in the earlier and later volumes. Nonetheless, the Fourth Span remains one of the distinctive elements in Bartók's mature music.

## NOTES

1. From a radio interview quoted by Peter Bartók in the Foreward to Mikrokosmos, New Definitive Edition (Boosey and Hawkes, 1987), p. 4.
2. Quoted in János Breuer, Liner Notes to Complete Edition: Mikrokosmos Volumes I-VI, Loránt Szűcs and Kronél Zempléni (Hungaraton, Lex 11405-7), p. 11. Jozsef Ujfalussy, one of Bartók's countrymen, collaborated with Breuer and wrote a book on the composer.
3. Peter Child, "Structural Unities in a Work of Bartók: 'Boating' from Mikrokosmos, Vol. 5," College Music Symposium, Volume 30, Number 1 (1990): 103.
4. Elliott Antokoletz, The Music of Béla Bartók: A Study of Tonality and Progression in Twentieth-Century Music (Berkeley: University of California Press, 1984), pp. 198-200.  
It will be the practice in this paper, when a specific piece is first mentioned, to give the piece number, in parentheses, after its title. Numbers 97-121 belong to Volume IV of Mikrokosmos; Numbers 122-139 belong to Volume V. Subsequent mention of a piece in a chapter will not include the piece number.
5. Richard Cohn, "Inversional Symmetry and Transpositional Combination in Bartók," Music Theory Spectrum, Volume 10 (1988): 19-42.
6. Child, "Structural Unities in 'Boating';" Harold Lewin, "A Graphic Analysis of Béla Bartók's 'Major Seconds Broken and Together,'" Theory and Practice, Volume 6, Number 2 (1981): 40-46.
7. Lawrence Starr, "Melody-Accompaniment Textures in the Music of Bartók as seen in his Mikrokosmos," Journal of Musicology, Volume 6, Number 1 (1985): 98.
8. Ibid.: 100
9. Richard Parks, "Harmonic Resources of Bartók's 'Fourths,'" Journal of Music Theory, Volume 25, Number 2 (1981): 271.
10. Ivan Waldbauer, "Interplay of Tonality and Non-Tonal Constructs in Three Pieces from the Mikrokosmos of Béla Bartók." Music and Context: Essays for John M. Ward, Ann Dhu Shapiro and Phyllis Benjamin, eds. (Cambridge, Massachusetts: Harvard University Press, 1985), pp. 418-440.

11. Benjamin Suchoff, Guide to Bartók's Mikrokosmos, 3rd ed. (London: Boosey & Hawkes, 1971). In this study, topics such as fingering and articulation are dealt with in minute detail, but references to harmonic structure are limited to occasional mention of "keys," and even these are often derived, without further elaboration, from Bartók's own comments.
12. William Dustin, "Two-Voiced Textures in the Mikrokosmos of Béla Bartók" (Ph.D. diss., Cornell University, 1959). One of Dustin's opening statements is that "the set is a collection of microcosms, many...of which represent explorations of particular compositional premises [pp. 3-4]." His point of concentration, however is on texture alone. Examples of counterpoint and numbers of discernible voices make up the bulk of his discussion.
13. Mary Elizabeth Parker, "Bartók's Mikrokosmos: A Survey of Pedagogical and Compositional Techniques" (D.M.A. thesis, University of Texas at Austin, 1987). In her overviews of each volume of Mikrokosmos, Parker somewhat arbitrarily pairs Volume I with Volume II, Volume III with Volume IV, and Volume V with Volume VI. Although done for sake of convenience, this decision, in the opinion of this writer, is a misjudgment; as the whole impetus behind the present paper suggests, a more natural pairing, based on structural similarities, exists between Volumes IV and V.
14. James Skoog, "Set Syntax in Béla Bartók's Mikrokosmos" (Ph.D. diss., Indiana University, 1985). Skoog's study adopts the provocative but ultimately abstract notion that recurring pitch-class sets pervade Volumes I through V.
15. Allen Forte, The Structure of Atonal Music (New Haven: Yale University Press, 1973), pp. 179-180. The application of "2-5" (a label for particular two-element set class) to the perfect fourth can be found in Robert D. Morris, Class Notes for Atonal Music Theory (Hanover, New Hampshire: Frog Peak Music, 1991), p. 105.
16. Antokoletz, The Music of Béla Bartók, p. 252.
17. Parker, "Bartók's Mikrokosmos," p. 11.
18. Joel Lester, Analytical Approaches to Twentieth-Century Music (New York: W.W. Norton, 1989), pp. 112-116.
19. See Joel Lester, Analytical Approaches, pp. 115-116, for a related discussion.

20. A study of Suchoff ("Ethnological Roots in Béla Bartók's Musical Language," World of Music, Volume 29, Number 1 (1987): 43-64), gives some initial promise in discovering the Fourth Span's genesis. A specimen of Hungarian folk music is described as having "non tonic-dominant relation, and the melodic contour has frequent leaps in fourths," but "the tonal organization...is its characteristic anahemitone-pentatonic scale [p. 46; emphasis added]." All the other folk modes described by Suchoff are either non-chromatic (in other words, they have only a limited option of possible semitone usage) or non-diatonic; almost all the modes fit both categories. The nature of these modes make any direct relationship with a piece like "Diminished Fifth" impossible.

János Breuer (Linear Notes to Complete Edition, p. 13) reports that while "Intermezzo" and "Peasant Dance" are Hungarian in style and "Change of Time" has a Romanian flavor, all of these melodies involved are original. Breuer provides an even more telling disavowal of folk material quotes within Mikrokosmos by quoting Bartók's description of the Six Dances in Bulgarian Rhythm (Volume VI, #148-153): "These are not Bulgarian folk-songs, merely rhythms...They are original compositions and do not contain folk melodies...Incidentally, many of the pieces in Bulgarian rhythm are not of Bulgarian character...[Ibid.]." Although the Six Dances are not a concern of this study, the preceding quote gives one an idea of the subordinate role of folk music within the Mikrokosmos in general.

21. John Vinton, "Toward a Chronology of the Mikrokosmos," Studia Musicologica, Volume 8, Number 1 (1966): 41-70.
22. János Kárpáti, Bartók's String Quartets, transl. Fred Macnicol (Budapest: Corvina Press, 1975), pp. 239-243.
23. Ibid., p. 241.
24. As mentioned in Chapter I, non-tonal constructs in "Free Variations," "Minor Seconds, Major Sevenths," and "Divided Arpeggios" are extensively discussed by Ivan Waldbauer, Interplay of Tonal and Non-Tonal Constructs).

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