

INSTRUMENTAL ORDERING-REGISTRATION
AS STRUCTURAL PROGRESSION
IN STRING QUARTETS

by

MAURICIO OLIVEROS-ROMERO

Bachelor of Music, 2000
Antonio Maria Valencia Conservatory
Cali, Colombia

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DEFINITIONS

Integer equivalent of pitch: Pitch is converted to integer equivalent by assigning 1 to the lowest pitch of the Cello (C2=1) and ascending chromatically in order. Thus, C#2=2, C4=25 and C7=61.

Pitch Line: Horizontal line that results from connecting chosen pitch (es) in every measure of the melodic line of a single instrument. Example: V1 pitch line, etc.

Pitch Average Line (P.A.L.): This term will be used to indicate the averaging of the pitch lines in all four instruments in each measure. Usually, adding four integers and dividing them by four will calculate the average. However, there will be instances where the average will be taken with less than four integers. These instances will be the result of the absence of an instrument (see example of *I.O. incomplete below*).

Specific Deviation from P.A.L.: Line resulting from averaging the distance between an individual instrument's pitch line and the P.A.L.


Overall Deviation from P.A.L.: (Spacing average) Line that results from averaging the distances between each respective instrument's pitch line and the P.A.L. This line will be shown in a graph with the Spacing Trend Line.

Spacing Trend Line: Averaging or "smoothing out" of Overall Deviation from P.A.L.; represented by straight line. The spacing Trend Line represents a norm of spacing for an individual movement; therefore, P.A.L. will appear in the Spacing Trend Line graph as $X = 0$.

Instrumental Ordering (I.O.): The ordering of instruments, from highest to lowest, based upon the ambient range in which each part is written. For this study, Violin I, Violin II, Viola, Cello will be considered standard ordering. See chart of various instrumental orderings below.

I.O. in incomplete textures: Found whenever one or more instruments are absent. The use of lower case applies to these incomplete gestures.

Fig. 1. Barber Op. 11, Adagio Molto mm. 34-38



Here the absence of the first violin results in a b^2 texture.

Instrumental Ordering and Registration (I.O.-r): This is the synthesis of all of the terms above. It best represents the structural changes in the music since it takes into account all the aspects that deal with texture and registration and their influence upon the form in a piece of music.

INSTRUMENTAL ORDERINGS (I.O.)

Fig. 2. Instrumental Ordering A. First violin written highest:

A	<i>Violin 1</i>	(V1)	A¹	V1	A²	V1	A³	V1	A⁴	V1	A⁵	V1
	<i>Violin 2</i>	(V2)		Va		V2		Vc		Vc		Va
	<i>Viola</i>	(Va)		V2		Vc		V2		Va		Vc
	<i>Violoncello</i>	(Vc)		Vc		Va		Va		V2		V2

Fig. 3. Schubert D minor. Op. Posth. (Death and the maiden), Andante con moto = **A**

Fig. 4. Instrumental Ordering B. Second Violin written highest:

B	<i>Violin 2</i>	(V2)	B¹	V2	B²	V2	B³	V2
	<i>Violin 1</i>	(V1)		Va		V1		Va
	<i>Viola</i>	(Va)		V1		Vc		Vc
	<i>Violoncello</i>	(Vc)		Vc		Va		V1

Fig. 5. Bartok Op. 7. No. 1, III mm. 37-38 = **B³**

Fig. 6. Instrumental Ordering C. Viola written highest:

C	<i>Viola</i>	(Va)	C¹	Va
	<i>Violin 1</i>	(V1)		V2
	<i>Violin 2</i>	(V2)		V1
	<i>Violoncello</i>	(Vc)		Vc

Fig. 7. Instrumental Ordering D. Cello written highest:

D	<i>Violoncello</i>	(Vc)	D¹	Vc
	<i>Violin 1</i>	(V1)		V2
	<i>Violin 2</i>	(V2)		V1
	<i>Viola</i>	(Va)		Va

The following examples will show the different types of I.O-r. in an A texture (I.O.)

Fig. 8. I.O.-r Close Position. Schubert D minor. Op. Posth. (Death and the maiden), Andante con moto

Andante con moto

The image shows a musical score for Schubert's 'Death and the Maiden' in D minor, Op. Posth. The score is for the first four instruments: Violin 1, Violin 2, Viola, and Violoncello. The tempo is marked 'Andante con moto' and the dynamics are marked 'pp' (pianissimo) for each instrument. The score is in close position, meaning the instruments are written in a way that they play the same notes in the same order, but on different staves.

Fig. 9. I.O.-r Open Position. Haydn Op. 76 No. 4, Adagio m.m 63-64



Fig. 10. I.O.-r Low Range. Barber Op. 11, Adagio Molto

Musical score for Fig. 10, showing four staves of music in B-flat major, 2/4 time, measures 63-64. The tempo is marked "Molto adagio". The score includes a vocal line and three piano accompaniment staves. The vocal line is marked *pp* and *espr. cantando*, featuring a melodic phrase starting on B-flat4, moving to C5, D5, and E5, with a fermata over the final note. The piano accompaniment consists of a steady eighth-note bass line and a treble line with chords and single notes, marked *pp*.

Fig. 11. High Range. Barber Op. 11, Adagio Molto

Musical score for Fig. 11, showing four staves of music in B-flat major, 2/4 time, measures 63-64. The tempo is marked "Molto adagio". The score includes a vocal line and three piano accompaniment staves. The vocal line is marked *ff* and features a melodic phrase starting on B-flat4, moving to C5, D5, and E5, with a fermata over the final note. The piano accompaniment consists of a steady eighth-note bass line and a treble line with chords and single notes, marked *ff*.

RULES

1. The chosen pitch should have harmonic and/or style-appropriate contrapuntal support. More over, it should be chosen according to its importance in the ongoing line. However, musical elements as *sfz*, *fp*, *accents*, *longer values*, *metric position*, among others, can be part of the criteria for choosing a note.
2. Whenever there are double stops and two independent melodic lines are implied, the diagram should show the two melodic lines. However, in the process of obtaining the Pitch Average Line (P.A.L.) or another average, the higher pitches are usually taken for the first and second violin, and the lower notes for the viola and cello. These outer voices usually hold the more prominent position in the texture, with a few exceptions.
3. Whenever there are double stops and the notes occupy a primarily non-linear role in support of the harmony, the higher pitch should be taken for the first and second violin respectively, and the lower pitch for the viola and cello respectively. However, the average of the double stops could also be taken as long as it does not alter the inferred textural ordering.
4. Pitch choice in a rapid ascending or descending scale should be made according to the sense of the ongoing line. Usually in an ascending scale, the higher note is chosen while the lower note for a descending scale.

5. Usually, one horizontal pitch per each measure in each melodic line should be shown. However, two horizontal pitches per measure can be used if the music requires it (Bartok, Schubert).

6. There are four main Instrumental Orderings (I.O.). These are,

A for any I.O. with the first violin on top

B for any I.O. with second violin on top

C for any I.O. with viola on top

D for any I.O. with cello on top

7. Reading of the graph:

This method will at first glance show how composers use the I.O. and I.O.-r to achieve structural progress. Once the graph is done, the reader should be able to see where the parts cross more into each other's ambient range. Normally, the A will be called the most stable Instrumental Ordering since it is significantly used at the beginning of a movement. However, there are pieces where the composers will choose a different ordering as their most stable I.O. Often, the places where the voices cross into each other's ranges for a significant period of time are important to structural progression. When feasible, middle C will appear as a reference point in a square yellow box with the number 25.

8. There will be places where the PAL might be equal, regardless of whether the melodic lines of each instrument are far apart or very close to each other. Of course, this will impact the reading of the graph. In order to differentiate between

these two different types of textures producing the Pitch Average Line, the *Overall Deviation from P.A.L.* must be shown.

9. Disparate metrical position will not be taken in consideration since it is not the purpose of this system. As a result, if an instrument *X* has a note on a strong beat of a measure, while another instrument *Y* has it on the weak beat of the same measure they both will be shown in the diagram in the same place. Example: in a 4/4 measure, *X* being on the first beat and *Y* being on the fourth beat.

10. Each instrument line will have a different color in the graph, assigning the dark color version to the lower line and the light version to the upper line of the Viola and the Cello. In the case of the first and second Violin, the dark color version should be assigned to the upper line and the light color version to the lower line.

Samuel Barber, String Quartet Op. 11, Molto Adagio

The second movement of the String Quartet Op. 11 (1936) is one of Barber's most famous works. This movement received such acclaim that Barber and other people have made transcriptions of it to different instrumentations, having the String Orchestra version (*Adagio for Strings*) as the most popular of them. The overall shape of this movement is a long arch, beginning quietly and gradually building to a big climax before finally winding to a quiet and calm end. Barber builds the movement from an endless, stepwise melody; creating development, transition and closure based entirely on this melody.

The way Barber uses Instrumental Ordering and registration (I.O.-r.) in this movement evidently supports its three sections; measures 1-28, 28-56 and 57-end. Here the structural imperatives of transition and closure (achieved through synthesis) clearly influence the composer's use of I.O. and I.O.-r.

The piece begins with the standard Instrumental Ordering (A). This continues throughout the first section (mm. 1-28) although sometimes incomplete. The second section is the most interesting. Here we find a clearly thought out transitional passage leading to the climax of the piece. One technique for building to a climax is to expand the space between the instruments (open position), especially the outer voices. This technique provides a natural growth in resonance. However, Barber's intention is for the climax to bring all the voices to their higher ranges by the manipulation the I.O.-r in a way that our ears do not perceive any sense of emptiness.

In measure 28 there is an elision between the first and second parts of the movement. When the first violin's melody line disappears, the cello's line is brought to a

high range and plays the main melody of the piece. The viola then takes over the role of the bass voice while the second violin becomes the highest sounding instrument (I.O. = b^2).

This continues until measure 39 when the first violin returns. Mm. 39-44 have an I.O. = A^3 since the return of the cello to the lowest registral position is too brief to have a significant effect upon the Instrumental Ordering.

Measures 44 – 46 are the final ascending movement towards the climax. The Instrumental Ordering moves through A^4 and A^5 in quick succession before moving toward the climax in measure 47 with the standard Instrumental Ordering (A).

A simple graphic of these changes will show the way Barber brings all the voices to a higher range.

Fig. 12. 1st and 2nd section I.O. progression (Barber, Op. 11, Mvt. II)

V1		V1	V1	V1	V1
V2	V2	Vc	Vc	Va	V2
Va	Vc	V2	Va	Vc	Va
Vc	Va	Va	V2	V2	Vc
A	b^2	A^3	A^4	A^5	A

These changes in Instrumental Ordering are presented in a smooth and seamless fashion. An interesting aspect that the study on the Overall Deviation from the Pitch Average Line (P.A.L.) reveals is the way that Barber sustains transition during the second section. Throughout the whole section, Barber uses less Deviation from the Pitch Average Line within the instruments. Also, The Overall Deviation from P.A.L. moves under the Spacing Trend Line (which can be defined as a relative norm as it is in Haydn)

with a few exceptions. This is important in the structure of the piece because transition is clearly differentiated from the other structural gestures (Introduction, Exposition, Development and Closure) by the treatment of I.O.-r.

After reaching the climax (mm. 50-53), the retransition (mm. 54-56) begins by bringing the voices to the lowest registration of the movement while maintaining the I.O.=A, and therefore, setting up the registration and texture of the first section. Also, this re-transition is reinforced by the chord progression. This is the classic example of re-transition, since the registration of the first section comes back before the melody appears to establish the third section. In other words, some musical parameters of the first section are used for the retransition, while others (as the melody) come back in the beginning of the third section.

The Third section has its most interesting aspect in the last three and a half measures. Here, the first violin is placed lower than the second violin and the viola (B^1). This Instrumental Ordering, which has not been seen before; provides synthesis between having a standard Instrumental Ordering (cello in the bass, and second violin higher than viola) as the characteristic of the first section, and the manipulation of the Instrumental Ordering found in the second section.

The following diagram will show the I.O. movement throughout the piece.

Fig. 13. Complete I.O. progression (Barber, Op. 11, Mvt. II)

m.m. 1-28	m.m. 29-38	m.m 39-43	m.m. 44	m.m 45-46	m.m 47-66	m.m 66-69
A	b^2	A^3	A^4	A^5	A	B^1

Even though this diagram shows the manipulation of Instrumental Ordering to create transition and closure (by synthesis), it does not clearly state the three main sections that can be seen in the main graph. Thus, a synthesis of both I.O. and I.O.-r (fig. 3) provides a better reading of the structural progression.

Fig. 14. Synthesis (Barber, Op. 11, Mvt. II)

	First Section mm. 1-28	Second Section mm. 29-56						CLIMAX	Third Section mm. 57-end	
	Exposition/Development	Transition						Re-transition	Closure	
mm.	1-28	29-38	39-43	44	45-46	47-53	54-56	57-66	66-69	
I.O. used	A	b2	A3	A4	A5	A	A	A	B1	
I.O.-r	Medium/Low Range Open Position	Medium Range going Higher and Higher Close Position						Low Range Open	Low Range Open Position	Low Range Open Pos.

The first section is visibly defined by I.O. and I.O.-r since there is no change at all. The structural differences between the exposition and the development are made by the other musical parameters such as melody and harmony. The second section is the most interesting. This transition starts with a different I.O.=b², which then moves through A³, A⁴, A⁵ and reaching the climax with I.O.=A. Moreover, I.O.-r significantly differs from the first section with a close position starting in a medium range that gradually moves higher and higher. After this, the retransition prepares the I.O.-r of the third section with the low range in open position. The third section evidently states a contrast to the second section. Here I.O.-r appears in a low range with an open position

remaining the same throughout this section. As mentioned before, $I.O. = B^1$ in the last measures provides a perfect example of closure by synthesis.

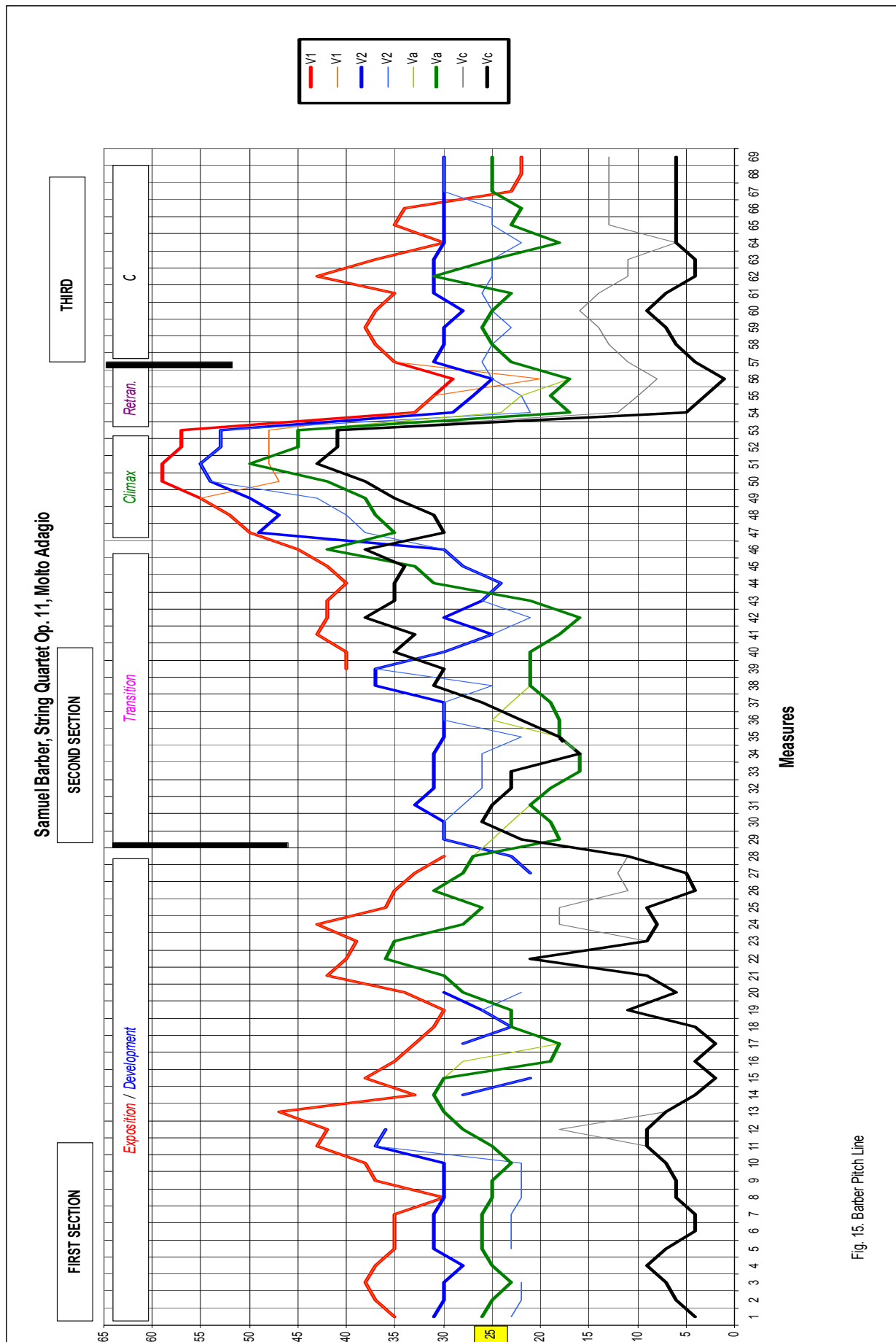


Fig. 15. Barber Pitch Line

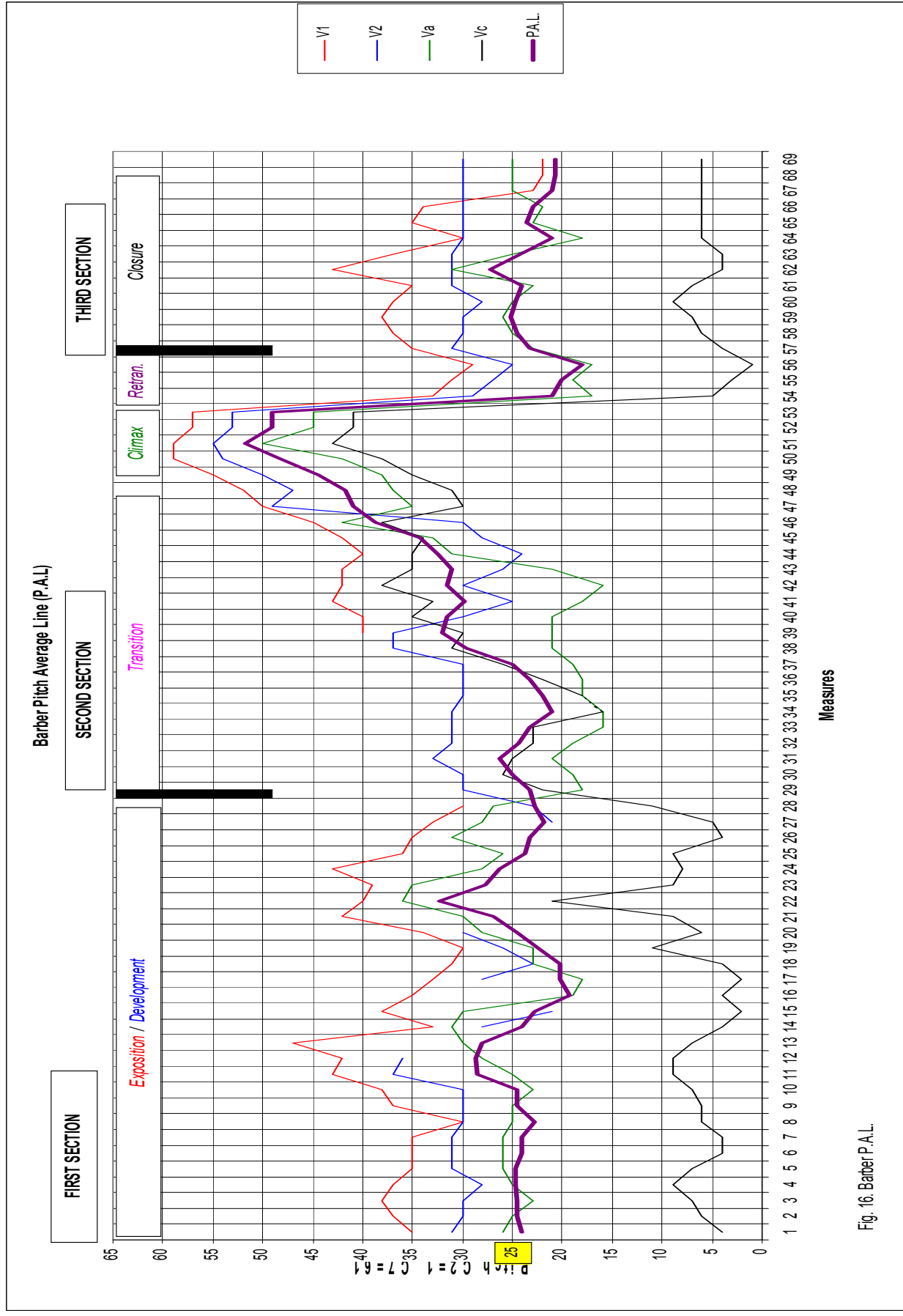


Fig. 16. Barber P.A.L.

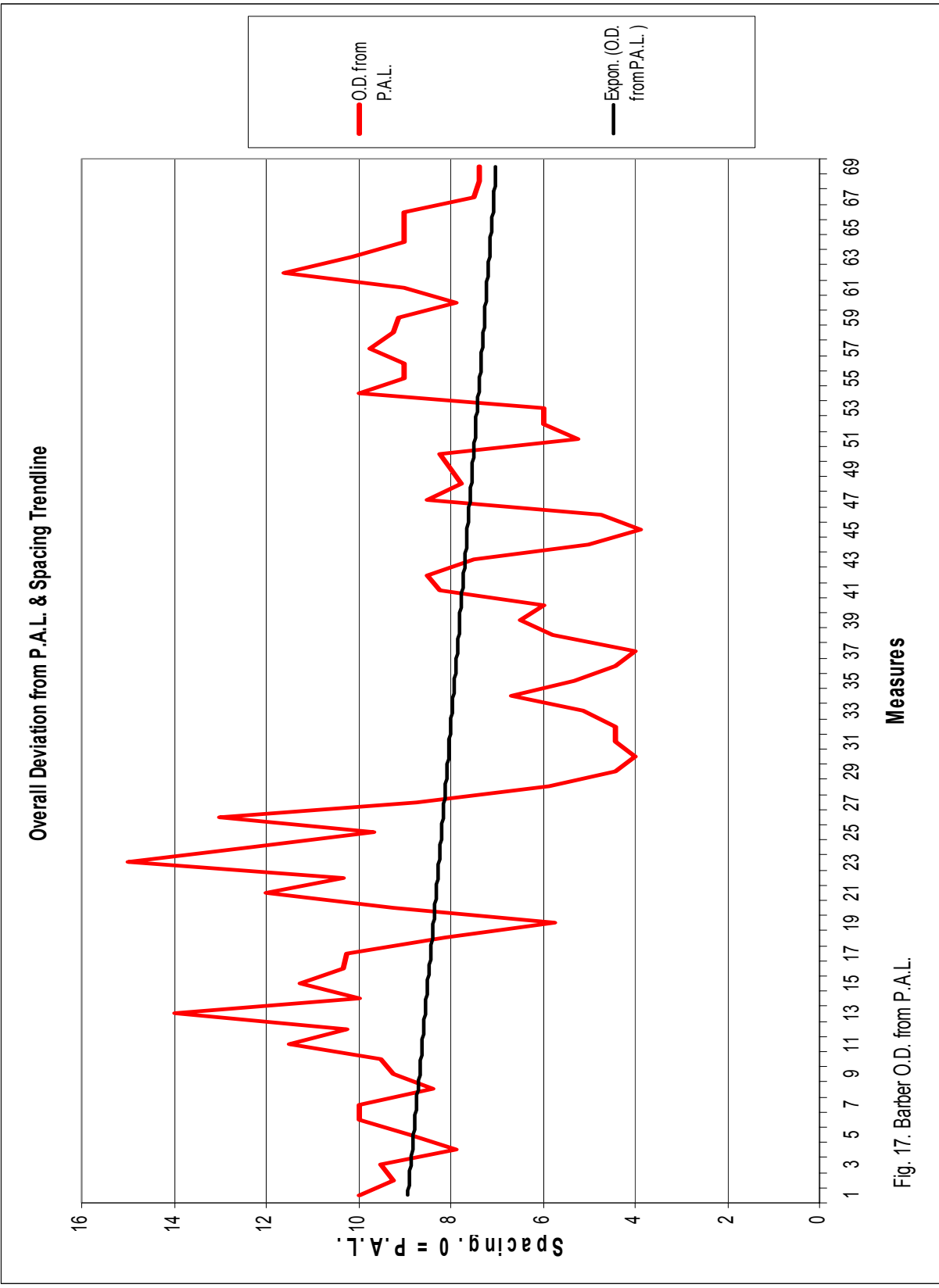


Fig. 17. Barber O.D. from P.A.L.

Franz Joseph Haydn, String Quartet Op. 76 No. 4 (Sunrise) – Mvt. II Adagio

The second movement (Adagio) has one theme that is used throughout the entire movement.

Fig. 18. Haydn, Op. 76. No. 4, Mvt.II. **Theme (E-flat major)**

The musical score for the theme is presented in four staves. The key signature is E-flat major (three flats) and the time signature is 3/4. The melody is simple and lyrical, consisting of a sequence of quarter notes followed by a half note with a fermata. The first staff (Violin I) starts with a quarter rest, then plays a half note followed by a quarter note. The second staff (Violin II) starts with a quarter note, then a half note with a fermata. The third staff (Viola) starts with a quarter note, then a half note with a fermata. The fourth staff (Cello/Double Bass) starts with a quarter note, then a half note with a fermata.

There is also a motive used for transitional and developmental structural gestures

Fig. 19. Haydn, Op. 76. No. 4, Mvt II (**Motive**)

The musical score for the motive is presented in four staves. The key signature is E-flat major (three flats) and the time signature is 3/4. The motive is a rhythmic pattern of eighth notes with triplets. The first staff (Violin I) plays a sequence of eighth notes with triplets. The second staff (Violin II) plays a quarter note followed by a half note. The third staff (Viola) plays a quarter note followed by a half note. The fourth staff (Cello/Double Bass) plays a quarter rest followed by a half note, then a sequence of eighth notes with triplets.

This movement is in ternary form. The second section starts in the key of the dominant (Bb Flat major) in measure 30. However, when the third section is reached, the main theme is not clearly stated for the listener. Here (m. 52) the key of Eb flat major returns and immediately it moves away from it, thereby furthering the development. This is a sensible technique, since this movement is monothematic and the listener has heard the theme throughout the first two sections. In other words, the theme is restated many times but always in a different way.

In this movement, the use of the Instrumental Ordering and Registration supports this ternary form and also delineates the three main sections. Standard Instrumental Ordering (I.O.=A) is used throughout the movement, but other orderings are also found. The first section (mm.1-30) has I.O. = A. There is a very interesting divergence from the Standard Instrumental Ordering in mm. 15-16 (I.O. =B), which sets up the transitional gesture of measures 11-30. Haydn creates developmental-transitional gestures by using incomplete Instrumental Orderings.

Fig. 20. 1st section I.O. progression (Haydn, Op. 76 No. 4, Mvt. II)

mm 1-4	5	6	7-8	9-10	11-14	15 - 16	17	18-20	21-22	23-30
A	a	a	A	a	A	B	a	A	a	A

The manipulation of I.O.-r is very important in this section. The movement starts with I.O.-r in the low register of the instruments. Then development starts in measure 9, by having the same I.O. (a-A), but this time the voices are farther apart from each other, spanning a wide range. Measure 15 contains the beginning of a developmental-

transitional gesture. V1, V2 and Va are positioned almost as they were at the beginning of the movement. Transition begins in measure 23, where the I.O. = A moves from a closed to a more open voicing by measure 29. This prepares for the more open I.O.-r. found in the second section of the movement.

The second section mm. 30-52 starts with a I.O. = A which remains the same throughout this section with the exception of m. 39 (I.O.=a), m. 43 (I.O.= b), m. 50 (I.O.= A¹) and m. 52 (I.O.=B). In contrast to the first section, the second uses complete Instrumental Ordering almost exclusively. I.O.-r. shows a pattern similar to the previous section, but this time with more contrast. Likewise, the high point of this section is found when the section comes to an end. Here the voices are in an I.O.-r higher than the close of the first section. Also at this point, I.O. = A¹ and I.O. = B are used to reinforce this climax and prepare for the arrival to the third section (A').

The third section mm.52-end starts with a high I.O.-r. Notably, Haydn does not immediately come back to the initial I.O.-r. The section starts with I.O. = a, which then after two measures becomes A. The graph clearly shows the movement to closure and the Coda of the last six measures. Interestingly, comparing the I.O.-r in the last six measures of the movement to the initial measures shows that, although both instances are stable, the I.O.-r. of the end of the movement is more stable than the I.O.-r. of the beginning. The first measures show a Vc pitch line that moves up and down, while the Vc pitch line of the Coda presents minimal movement. This is because the outset of a piece should have less stability than its closure.

A closer analysis of the preparation for the Coda reveals three interesting possible divisions. The first division (mm. 52-62) has a very subtle movement in the instruments'

pitch lines with a V1 pitch line that is clearly separated from the other three. The second division (mm.63-69) has two rapid changes of I.O.-r. Here we find a very open range disposition followed by a very close range disposition, having one of the V1 melody lines as the lowest note (I.O. = B³). These sudden changes of I.O.-r characterize the coda, which finally moves to a I.O.-r. similar to the beginning of the movement. This time, however, the Vc pitch line is clearly separated from the other three lines.

The Overall Deviation from Pitch Average Line (O.D. from P.A.L.) and Spacing Trend Line graph reinforces the structural changes that are seen in the other graphs. Here, the Spacing Trend Line provides a norm of spacing established for this movement that when compared to the actual spacing of the movement brings some interesting aspects to light. The spacing in the first ten measures of the movement remains close to the O.D. from P.A.L. supporting the stable characteristic of an Exposition. As found in the other graphs, this graph makes a clear difference between the Exposition and Closure stabilities. Thus, mm.69-end has a spacing that remains closer to the O.D. from P.A.L. providing the most stable moment of the movement. Also interesting is m. 68, which “resolves” as it moves from high to low relative to the spacing trend line.

The beginning of the second section is made clear by the graph. It is the first time that the Overall Deviation from P.A.L. joins the same point of the Spacing Trend Line. This is highly significant since it completely reinforces the modulation to Bb flat major.

Once again the graph supports the ongoing musical aspects in the third section. As mentioned before, the third section starts in the key of Eb flat major and immediately moves away from it (creating more development) and then gradually comes back to reiterate closure. Thus, the graph shows an Overall Deviation from P.A.L. that rapidly

moves above and below the Spacing Trend Line, getting closer and further until it settles very close to it in the last measures. This reinforces the idea of the third section, which is to further development until the very end (Coda) where all the musical aspects come together to close the movement.

Figure 21 provides a synthesis of all of the aspects mentioned in this analysis. The First section has three clear structural progressions (exposition, development and transition) that are clearly separated by the difference in I.O.-r. However, The Instrumental Ordering reinforces the gradual movement (almost overlap) from development to transition by using the same I.O. = B to tie one to the other. Moreover, the unstable characteristics of the transition can evidently be seen by the use different registrations.

The development in the Second section starts with an open related I.O.-r that makes contrast to the predominant close related I.O.-r of the first section. The re-transition moves from low to high range using I.O. = A, b, B. This last aspect is significant since it gives the re-transition a more varied use of Instrumental Ordering compared to the previous transition. Furthermore, studying the position of the I.O. = B in the First and Second section brings an interesting issue. Here, it is possible to see how the transition in the first section starts with I.O. = B but then finishes with I.O. = A, while the re-transition starts with I.O. = A and then closes with I.O. = B. This is also significant since the re-transition ends with a contrasting Instrumental Ordering before going to the recapitulation (Third Section) that starts with a I.O. = A.

The Third section is strongly stable overall, since it mostly has I.O. = A. The stability of development and closure are reinforced and differentiated from the

development/transition by the use of close related I.O.-r. The gradual movement towards closure can be clearly observed in the movement from medium range to medium/low to low, providing a perfect sense of ending.

Fig. 21: Synthesis (Haydn, Op. 76 No. 4, Mvt. III)

	First Section mm. 1-30		Second Section mm. 30-52		Third Section mm. 52-end			
	Exposition	Development	Transition	Development	Retransition	Development	Develop/Transition	Closure
mm.	1-8	9-15	16-30	30-41	42-51	52-61	61-68	69-74
I.O. used	A a A	a A B	B a A	A a	A b A B	a A	A	A
I.O. - r	Low Range Close Related	Medium Range Close Related	Low/Medium/ High Close/Open	High/Medium Open Related	Low/High Open/Close	Medium Range Close Related	Medium/Low Open Related	Low Close

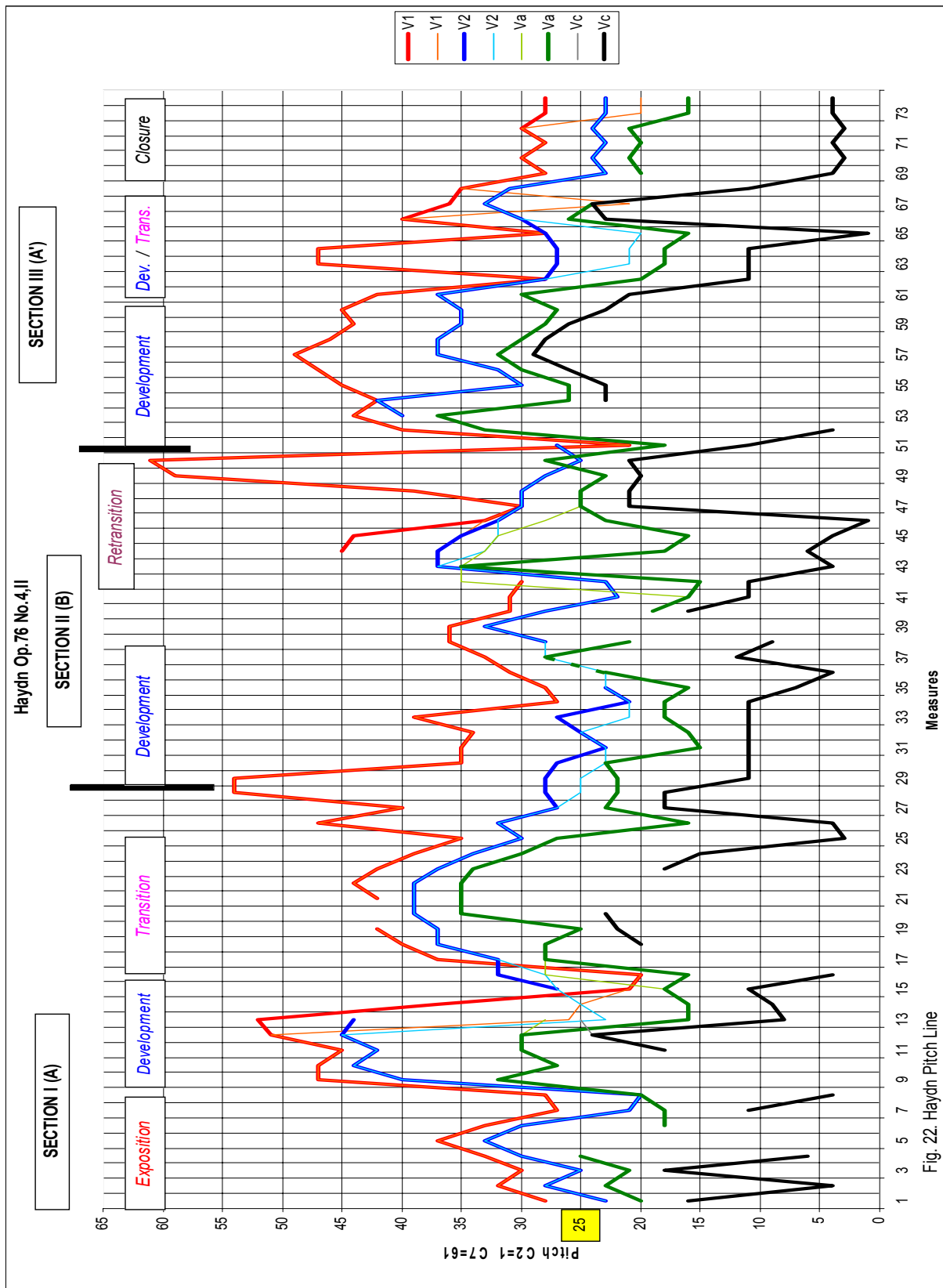
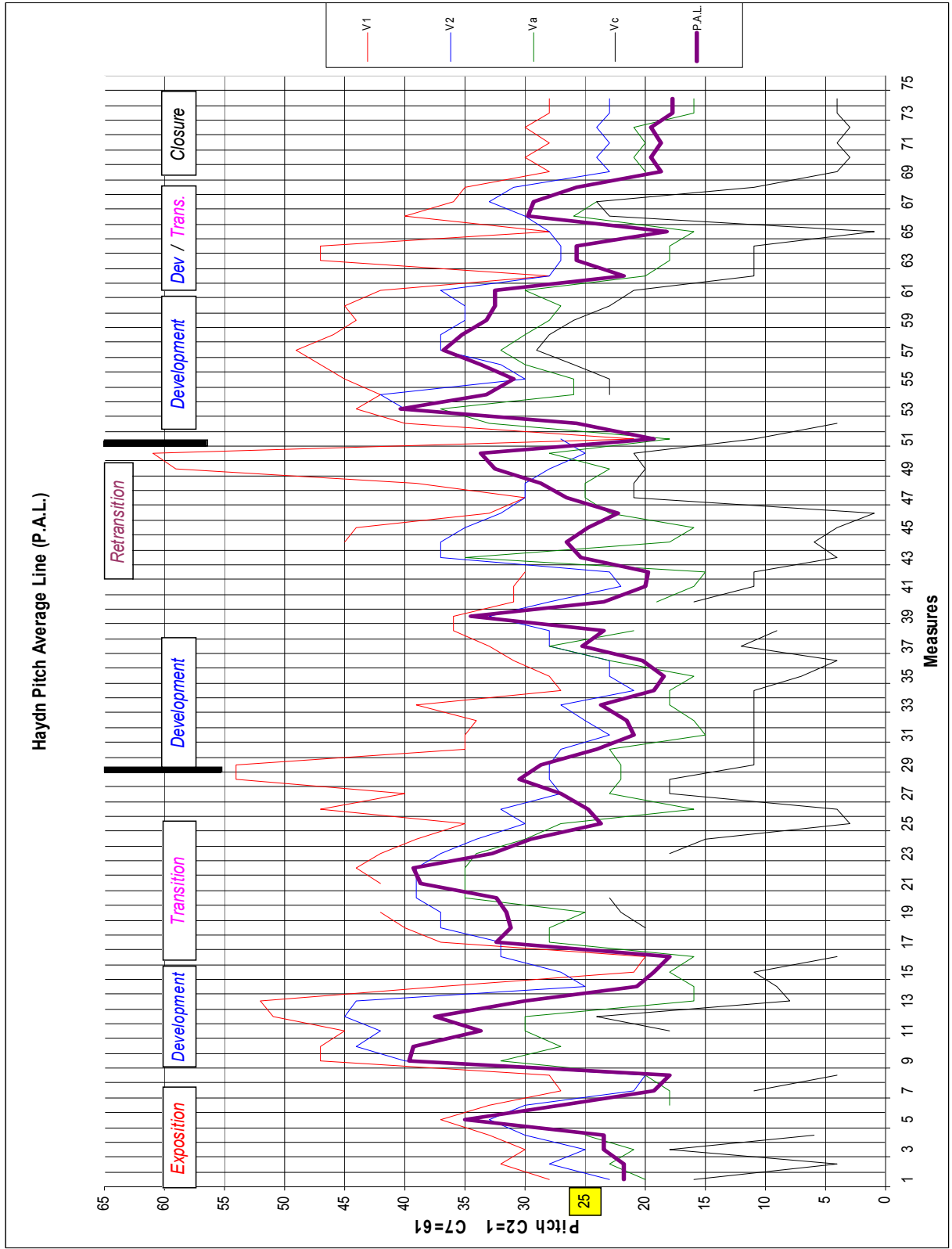


Fig. 22. Haydn Pitch Line



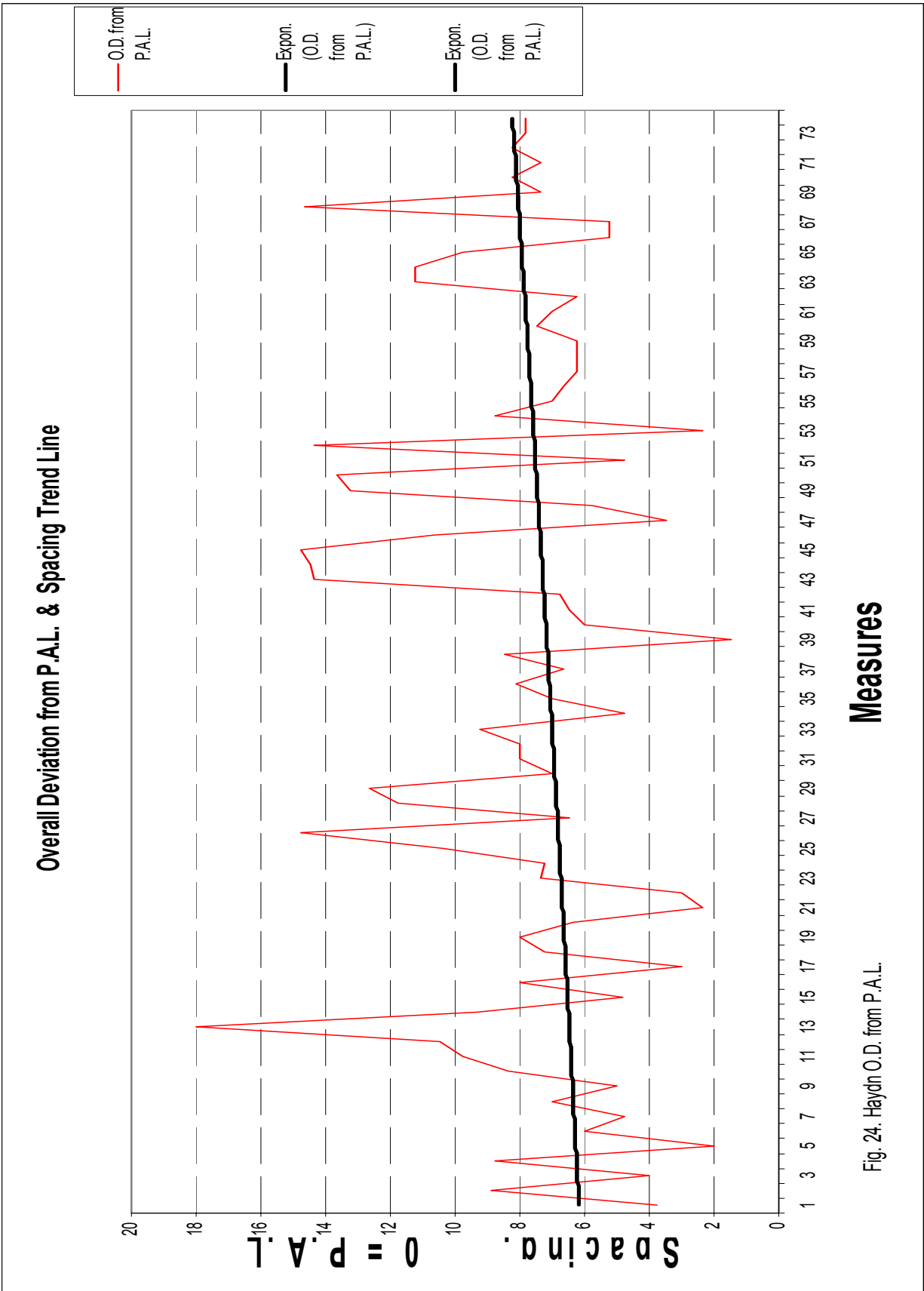


Fig. 24. Haydn O.D. from P.A.L.

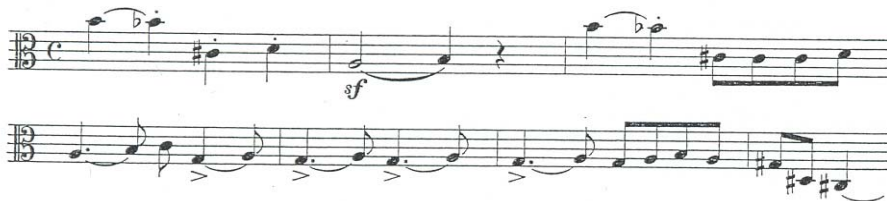
Measures

Béla Bartók. String Quartet No. 1 Op. 7, III Allegro vivace

Béla Bartók began the composition of this work during the first months of 1908 and completed it in January of 1909. However there are various sketches, which apparently date from 1907. This string quartet is one of Bartók's experimental works despite its maturity. Furthermore, the so-called folk music elements appear isolated, which make of it a much more "pioneering" work.¹

The third movement of this work is divided into Introduzione – Allegro vivace. However, only the Allegro vivace will be analyzed. This Allegro vivace is written in organic sonata form. The theme consists of two parts:

Fig. 25. Bartók Op. 1 No. 7 (theme)



These two parts of the theme are the basis of the whole movement since all the materials are developed from them, with the exception of the new material introduced in the first Adagio (rehearsal **11**)*. The Exposition **1-13** (mm. 1-120) is divided in two sections. The first section **1-8** is characterized by the use of the first part of the theme with variations in character. Also another thematic element derived from the principal theme (in appoggiatura-like fashion) is introduced in this first section:

Fig. 26. Bartók Op. 1 No. 7 (Thematic element)



* Here, bold numbers represent rehearsal numbers in the score.

¹János Kárpáti, *Bartók's String Quartets* (Hungary: Corvina Press, 1975), 10.

The second section (**9-13**) features the second theme of the exposition. This second syncopated theme is developed from the second part of the theme. The Adagio (**11**) presents the new material with folk character, which along with the syncopated theme from the secondary group of themes characteristic of sonata form.

The development section starts at **14** and ends at **27**. This section starts using the first part of the principal theme. After this, a fugato based on one of the variations of this first part of the theme (**4**) provides a scherzando mood. The rest of the development uses a combination of the latter part of the fugato with the thematic element derived from the principal theme. The retransition uses the pedal E seen at the beginning in the violins.

The recapitulation starts at **28**. Here all the variations and themes are heard. This is easily achieved since all the elements of them are organically related to each other. The coda appears at **39** providing the appoggiatura-like thematic element and the syncopated theme.

The manipulation of I.O.-r in this movement is used for two different purposes. One is to reinforce the structural imperative in the ongoing musical progression. The other is to provide balance; in other words, while other musical aspects such as harmony and melody might be emphasizing transition (or another structural function) the manipulation of I.O.-r might be at its most stable so as to provide balance. This makes complete sense since not all the musical aspects need to change at the same time in order to create progression. The P.A.L and O.D. from P.A.L graphs will not be used in this analysis and this will be further explained in the conclusions.

For the analysis of this movement, one pitch per half note was chosen horizontally. Thus, a 3/2 measure will have three horizontal pitches.

Exposition (Beginning - 13)

The Exposition can be divided into different sections, which are supported by their role in the ongoing musical progression and/or by their marked difference in I.O.-r.

The section between the beginning and rehearsal **3** shows four different types of Instrumental Ordering (A, A², B¹ and B³) mostly in close position within the middle range. More over, these changes in I.O. occur at each rehearsal number:

0-1 A

1-2 A²

2-3 B¹

3-4 B³

This manipulation of I.O. provides different textures that, although different, are used to reinforce the stable element of this first section of the exposition. This provides a variety of textures that will be used in the same fashion or developed later in the piece.

Furthermore, the equalization of the viola and cello lines at the beginning will be developed in other instruments, becoming an interesting aspect of the ongoing structure.

Rehearsals **4 - 8** provide various different instrumental orderings and registrations providing textural variation. This section is developmental/transitional-closure (closing the first half of the exposition), and this is visibly reinforced through the use of these different textures. Moreover, there are incomplete instrumental orderings in **4-6** that strengthen the transitional-developmental gestures. In rehearsal **7** up until rehearsal **8** the first part of the theme (which can be seen in the viola and cello pitch lines) is combined with the appoggiatura like theme in a transitional gesture. This is reinforced

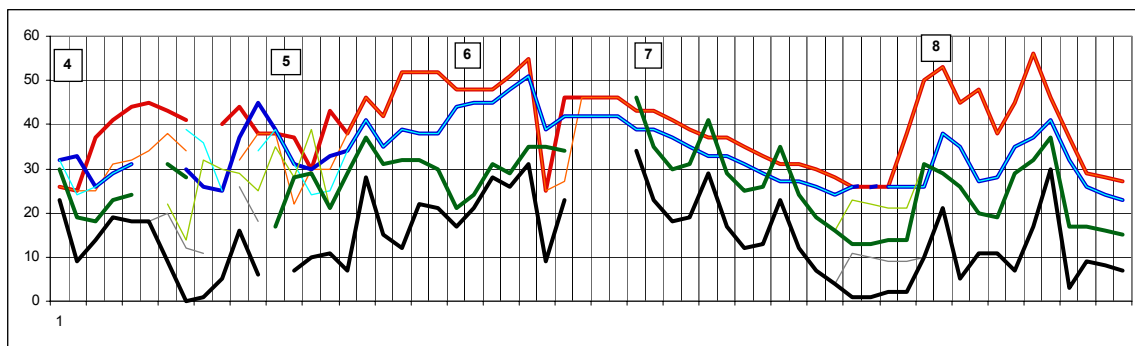
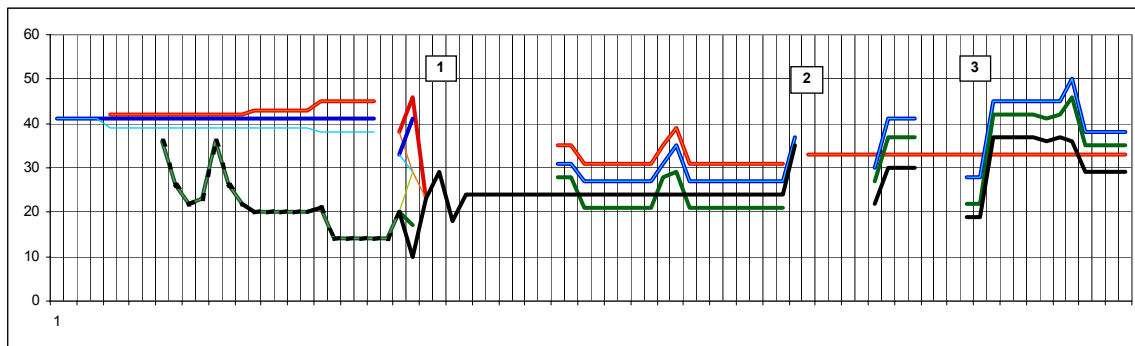
with the manipulation of I.O.-r since it is gradually moving from the upper register to the lower register, changing constantly from I.O. = A in open position to I.O. = C in close position. After **8**, stability is provided and closure achieved through the use of standard Instrumental Ordering in mostly open position.

The second half of the exposition (**9-13**) can also be divided into two sections. **9-11** is mostly developmental even though the Adagio in **11** can also give a sense of transition to the closing section (**12-13**). Despite this, this section presents mostly a stable I.O. = A (even though **9** begins with I.O. = b) that fluctuates between close position and open position, giving more emphasis to its developmental function. The adagio in **11** provides an interesting ambiguity. This Adagio provides a climax in this section (clearly supported by I.O.-r and the dynamic marks). This makes a strong case for it to be called stable, which is not a characteristic of transitional gestures. However, the following closing theme (**12-13**) does not support this theory. Thus, this Adagio can be seen as an overlapping of functions, where the stable element turns into unstable to then give way to the closing theme.

12-13 features the closing theme, which contains the syncopated rhythm (found at the beginning of **9**). Here, the standard Instrumental Ordering is interrupted at the beginning of **13** because of the absence of the viola and cello lines (I.O. = a), but this does not alter the overall stable gesture of this closure. **12** is presented in close position, while **13** is presented in open position. However, this change is interestingly prepared by the manipulation of I.O.-r. At **12**, the four instrument's lines appear in close position with almost the same spacing between lines. Then the first violin and second violin lines move to a higher register while keeping the close position between them. This enlarges

the spacing between first/second violin lines and viola/cello lines. After this (13), the first violin and second violin achieved the open position to then join the same register while the viola and the cello reappear in a clear open position. This successfully closes the exposition, having a synthesis of all the previous textures and changes of I.O.-r. This synthesis is made by the first and second violins, which are sharing the same line; and the viola and cello complementing lines in open position. Another fascinating aspect is the way Bartók prepares the beginning of the development by having the instrument's pitch lines in stationary motion (in the graph) at the end of this section, which is then carried over in beginning of the development.

BARTOK, STRING QUARTET No. 1 OP. 7, III Allegro Vivace

EXPOSITION

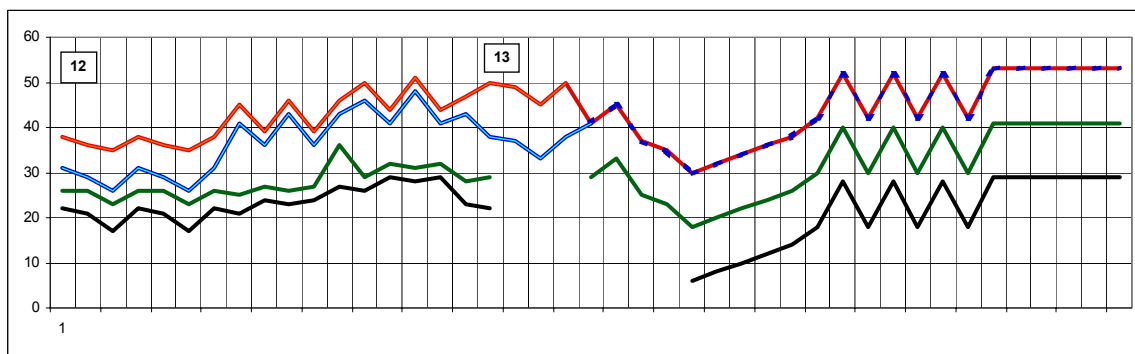
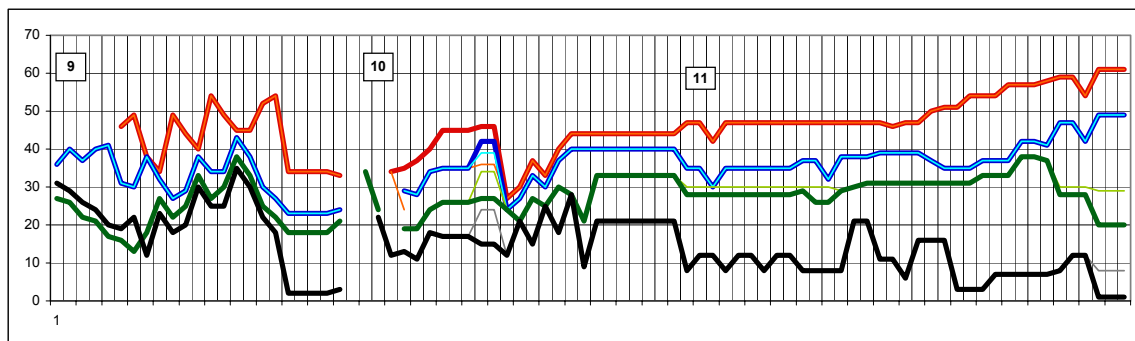


Fig. 27. Bartok Pitch Line (Exposition)

Development (14-27).

The Development can be divided in to three sections: **14-16**, **17-24** and **25-27**.

14-16 is developmental in essence. It combines the first part of the principal theme with the syncopated theme. It begins in the same fashion of the beginning of the exposition (with a pedal pitch) and then is passed to the cello pitch line, reinforcing its developmental characteristics. The changes in I.O.-r support this constant development especially in **15** where the idea of synthesis in I.O.-r (found at the end of the exposition by the first and second violin lines) comes back, providing a stable element in this section. The unison at **16** (all lines in the same points) provides a sort of closing gesture to this part of the development. This I.O.-r where all the lines are equalized (and therefore any instrument could be taken as lowest or highest sounding) provides a new texture (and moreover color) that sets up the fugato of the next section.

17-24 features the fugato passage of the development. This section follows the expository-developmental- transition sequence. Typical of fugato, this section starts stable despite the incomplete I.O.'s (not all voices begin a fugato) at the beginning.

17-19 shows the imitative entrances of each voice in its own range having I.O. = a- A.

17 is not called I.O = c, or **18** is not I.O. = b, since in this fugato the voices begin in their respective range. Thus **17-18**, as well as **19** are all (A) Instrumental Ordering types.

20 marks the end of the entrances in the fugato, which then gives way to the developmental gesture. This is evidently prepared by the manipulation of I.O.-r. This is done by gradually going to the lower register until, once again, the first violin pitch line and second violin pitch line join same register. Developmental motion begins at **21**, as is

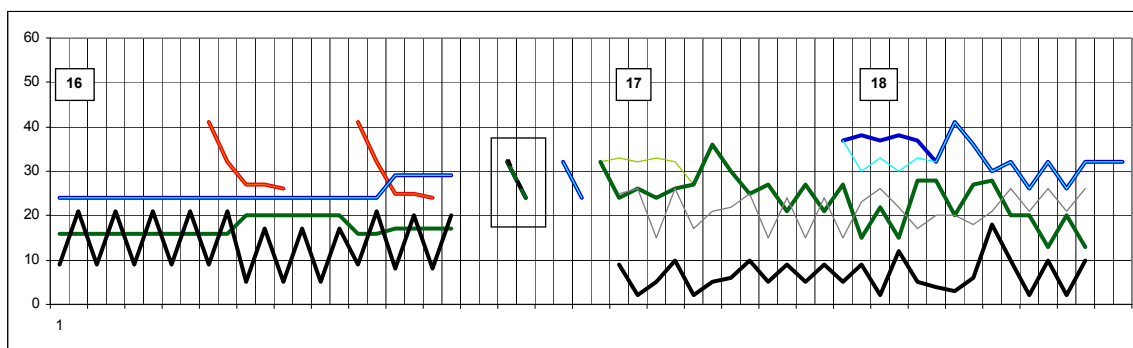
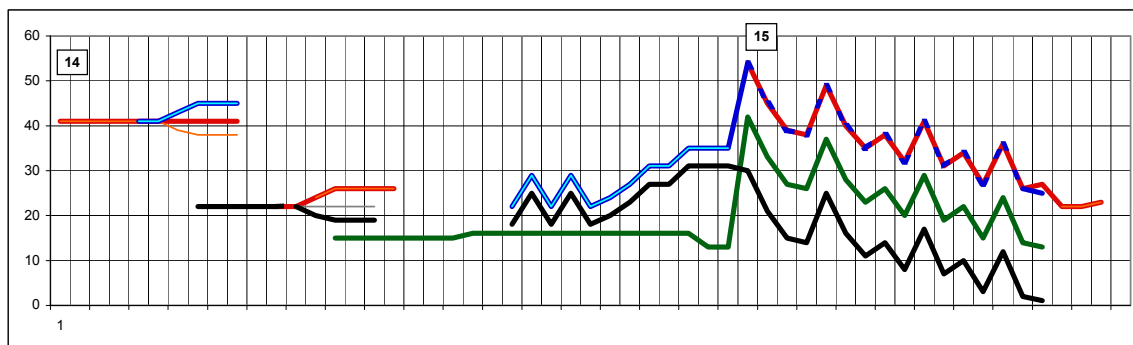
easily seen in the graph. Here, the technique of stretto is used with the latter part of the fugato subject. This is alternated between first and second violin, and viola and cello. Thus, I.O. = A in open position and I.O. = C in close position rapidly alternate, as it was used before at 7. However, while these rapid changes in Instrumental Ordering and Registration were used earlier to reinforce transition (7), here (21) these same changes are used to reinforce development. 22-24 continues the development then gives way to the overlapping of development and transition in 23. However, the development in 22 and 23 seems to be done by the changes in register (lower and higher register respectively) while maintaining the same I.O. = A. After this (24) variations in Instrumental Ordering (b-a) continue the development, while moving smoothly into the next section.

25-27 gradually moves from development to retransition. 25 begins with I.O. = A in close position, which then changes into open position. Here, the development is still reinforced with these variations of I.O.-r. 26 is the breaking point, or in other words, is the beginning of the overlapping of gestures. At the beginning of 26, I.O. = A rapidly alternates open and close position. Then, I.O. = A stabilizes in open position for some measures. After this, the manipulation of I.O.-r visibly hints the arrival of the transition. First, the first and second violin pitch lines disappear (I.O. = c). Following this, a complete I.O. = A in open position is used to set up the transition itself. 27 is the pure retransition. Here the first violin pitch line remains steady in an ostinato fashion. The other instrument pitch lines move gradually to a higher register and gradually from open to close position.

Overall, the I.O. progression in the retransition moves rapidly through different instrumental orderings in the following manner: $a - A^1 - a - A^1 - a - A - A^3$.

This rapid movement in I.O. and gradual change of register reinforces the unstable characteristics of a transitional gesture.

DEVELOPMENT



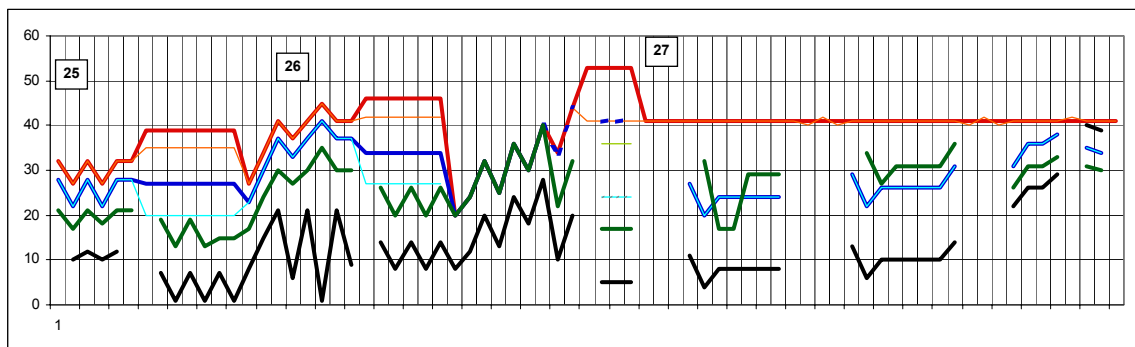
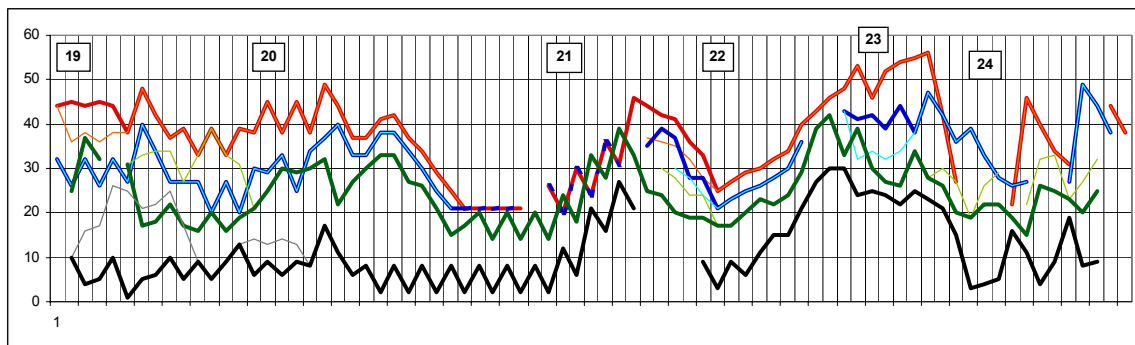


Fig. 28. Bartok Pitch Line (Development)

Recapitulation (28-39)

This recapitulation presents an overall strong developmental gesture within the other functional imperatives. The coda appears in **39** closing the work through synthesis.

28- 30 (first half) presents the principal theme in a more developed fashion. This is corroborated by the use of standard Instrumental Ordering (A) with mostly open position. The small changes to close position provide the developmental gesture that a work like this should have (since all the elements are organically related). The beginning of **28** resembles the beginning of both the exposition and the development with the use of I.O. = a. Another aspect that supports the developmental gesture is the spacing between the pitch lines, which is greater than the one found at the exposition.

30 (second half)-**31** is transitional in function. Here the appoggiatura-like theme is used to transition to a development that provides intense tension with the juxtaposition of themes. However, these transitional aspects are not clearly reinforced with the use of I.O.-r. Here, I.O. = A in mostly open position. There are some absences of the two violins pitch lines, but this is not very significant because they occur for one beat (half note) in a fast tempo. Despite this, the final movement towards the developmental gesture can evidently be seen. In the last measure of **31**, only two lines are shown; since both violins appear in the same line, while the cello and viola appear together in the other line.

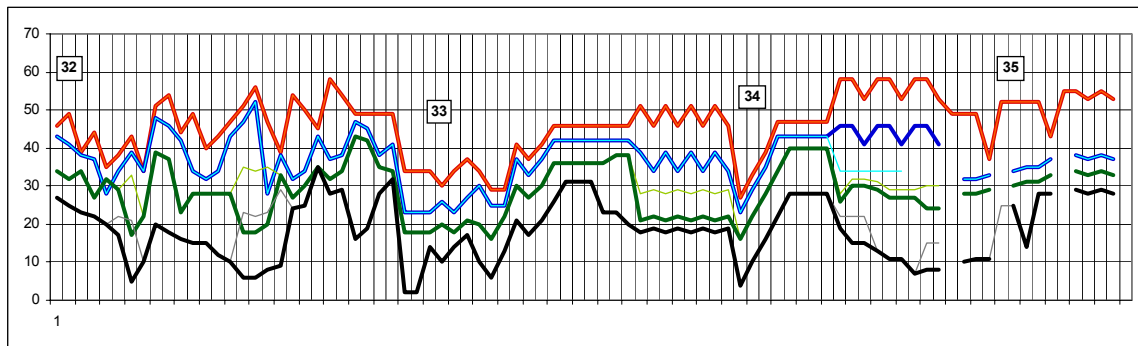
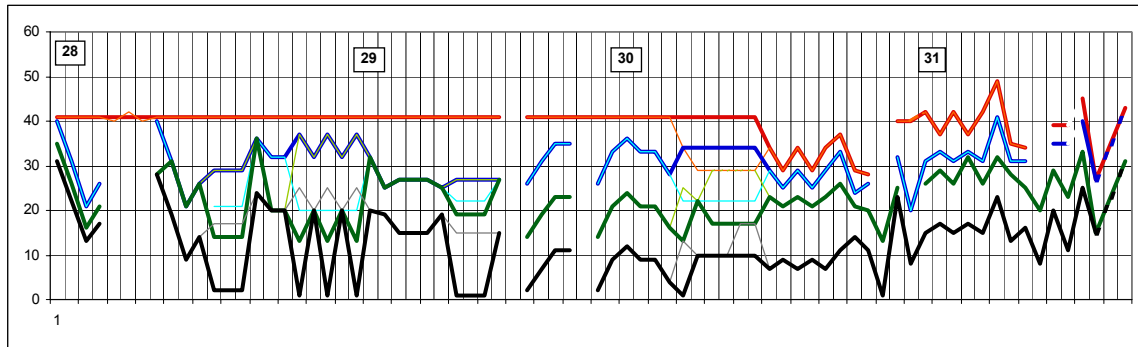
32-35 (first half) presents an increase in energy through development. Here, the syncopated theme (used for the second half of the exposition) is combined with the latter part of the fugato theme (**32-33**). Also, the appoggiatura-like theme is stated again (**33**), and, after a quick statement of the latter half of the fugato theme, the Adagio (**34-35**)

reappears to create the final movement to the closing section. The exposition closed in the same manner.

The stable aspects of the development are made manifest in the graph. Standard Instrumental Ordering is used throughout the whole section with some incomplete (a) at the end of this section (which is the final movement towards the closing section). The changes in register happen at almost each rehearsal number. **33** stands out because of its difference made by the close position at the beginning which then converts into open position. The beginning of the Adagio (**34**) moves to the wide-open position that was used for the Adagio in **11**. Once again, the graph presents evidence of this relationship between sections.

35 (second half) –**39** presents the closing section. The beginning of the closing section (**35** second half – **36**) provides a very interesting aspect. Here, the lines in the graph appear in identical shape as **12-13** (which is the closing section of the exposition). This is the only episode that actually looks the same as a section of the exposition. This is extremely important, since Bartok chooses the most stable of all structural functions (closure), to be imitated in the recapitulation. In spite of this, Bartok elongates the closing section adding a small transitional gesture (**37**) to move towards the last statement of the principal theme (**38**). However, this transitional gesture is not visibly recognized in the graph (I.O. = A in open position), even though a sense of movement towards the final episode could be inferred because of the ascending motion of the pitch lines. **38**, as mentioned before, presents the last statement of the theme. The incomplete I.O.= a, which is the characteristic of the principal theme, is once again seen. At the end, the standard Instrumental Ordering in open position sets up the coda.

The coda (**39**) gives a synthesis of the main different features of I.O.-r in the movement. First, the incomplete I.O. = a starts the coda. Then, a straight descending line is made by the alternation of pitch lines (V1- V2 - Va). Subsequently, the pitch lines are equalized and come together in the same register (as seen at **16**). Following this unison, the I.O. = A with the two violins in the same line sets up the I.O = A in open position of the final measure. This final I.O.-r also provides synthesis with the juxtaposition of registers between first violin, second violin and viola pitch lines.

RECAPITULATION

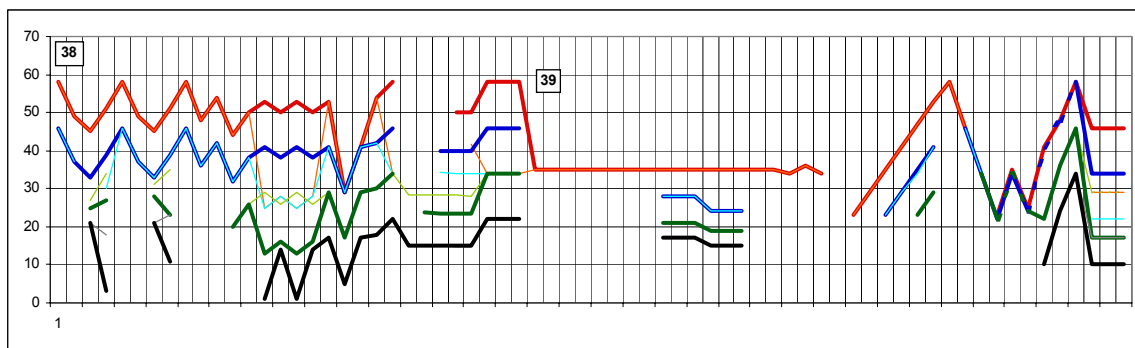
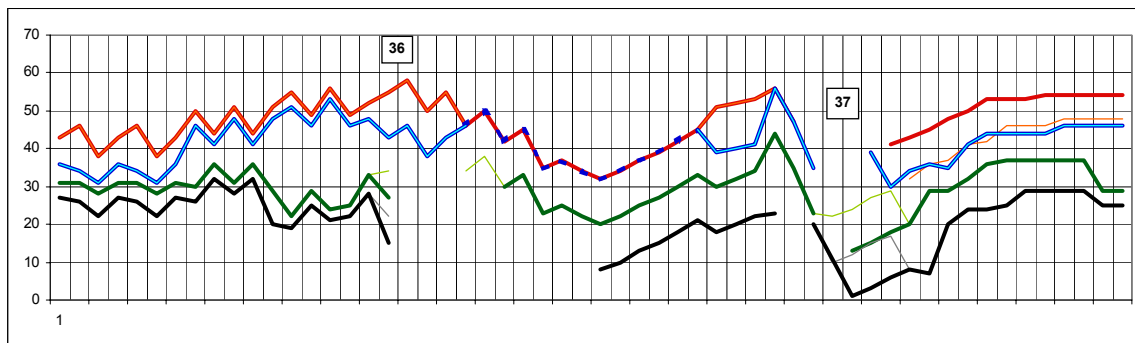


Fig. 29. Bartok Pitch Line (Recapitulation)

Franz Schubert, String Quartet No. 14 in D minor, D. 810 “Death and the Maiden.” Andante con moto.

This string quartet was completed in March 1824, a period of illness during which Schubert was unoptimistic about his recovery. The nickname “Death and the Maiden” (*Der Tod und das Mädchen*) comes from the second movement, which is a set of variations on Schubert’s setting of Claudius’s poem *Der Tod und das Mädchen*, written in 1817.

The form of this chorale-like theme is sectional binary. The first section (mm. 1-8) starts and closes in the key of G minor. The second section (mm. 9-24), twice as long; starts in the key of E-flat Major (VI in G minor), which is then reaffirmed in the cadence of mm. 15-16 (V/V in E-flat Major). After this, the harmony rapidly moves towards G, but this time finishing in G Major. The rhythm of the theme maintains unity through the use of half notes and quarter notes. This first half of the second section (mm. 9-16) can be seen as transitional-developmental that then turns into a more stable (developmental) gesture at the beginning of the second half (m. 17-24). This second half rapidly moves towards transition and closure in the last four measures.

This movement has five variations and a Coda. The treatment of the Instrumental Ordering and Registration clearly illustrates the difference between each variation. For the analysis of this movement, two horizontal pitches per measure in each instrument were chosen and only second endings were taken into account. The unity characteristic of Theme and Variation form can be seen in the Pitch Average Line (P.A.L.) graph, since it moves within a relatively small area.

In this work it is useful to consider Instrumental Ordering apart from registration because it clearly differentiates each variation. The following figure shows the different Instrumental Orderings used in each variation (the letters in parenthesis represent very small changes).

Fig. 30. Complete I.O. progression (Schubert, D. 810 No. 14, Mvt. II)

Theme	Var. I	Var. II	Var. III	Var. IV	Var. V	Coda
A	A (B ¹)	A ² A ³ A	A (B) a	A ² A	A (A ²)	A

Variations III and I stand different from the others since there is presence of B types of Instrumental Ordering (although for small periods of time). These two variations have a first violin pitch line that moves through all its range. As a result, the first violin pitch line crosses the second violin and viola pitch lines, creating the I.O. = B.

Another interesting aspect is the fact that these changes in Instrumental Ordering are placed in the first half of the second section (middle of the graphs), which prominently reinforces their transitional function.

Variations II, IV and V stand in contrast to those previously mentioned. These variations have presence of A² and A³ Instrumental Ordering types. This is due to the fact that the cello pitch line moves above the viola and second violin pitch lines (especially in variation II, where the cello line features the most prominent melody), thus, creating different color and textures.

The theme and the coda both have the standard Instrumental Ordering only. Once again the stable elements of exposition (as the entire theme could be called) and closure (coda) are strongly reinforced by the use of I.O. = A without any variation at all.

Let us now turn to issues relative to registration. The manipulation of I.O.-r not only helps to differentiate each variation, but also reinforces the structural changes within each variation.

The theme starts and ends with I.O. = A with close position in the middle range, which sets a norm of spacing and registration. Interestingly, the first part of the second section presents a slight but meaningful change in I.O.-r. This is achieved by the increase of spacing between the cello line and the other three instrument's lines, which strengthens the transitional gesture of this part of the theme. Moreover, the Overall Deviation from the Pitch Average Line (see O.D. from P.A.L. graph) evidently supports this transition, since it presents more rapid and extreme changes than the first section and the second half of the second section.

Variation I starts with I.O. = A in close position. However, it ends in a very open position, creating a contrast to the Theme's overall I.O.-r. The Pitch Average Line (P.A.L.) remains almost as it was seen in the Theme. Here, Schubert compensates the separation of the first violin pitch line by having the other three pitch lines (V2, Va and Vc) relatively close. Even though the P.A.L. of both the Theme and Variation I are very similar, the Overall Deviation from P.A.L. and the Spacing Trend Line of this first variation provide a recognizable difference. At this point, the space between the pitch lines is greater, which results in an Overall Deviation from P.A.L. that remains primarily over the Spacing Trend Line. This provides a good contrast to the Theme's O.D. from P.A.L. which remained mainly below the Spacing Trend Line.

Another important aspect is the synthesis of Instrumental Ordering and Registration found in the second half of the second section. As stated before, the first half of the second section presents the changes in Instrumental Ordering ($A + B^1$), which provides a rapid alternation of small and large spacing between the instrument's pitch lines. The second half of the second section takes this I.O.-r and the one used for the first section (V1 pitch line apart from the close V2, Va and Vc pitch lines) and combines them. This is accomplished by having the second violin and viola pitch lines in close position, and the first violin and cello pitch lines in very open position. More over, this is reinforced in the O.D from P.A.L. and Spacing Trend Line graph, since the O.D. from P.A.L. (in the second half of the second section) remains above the Spacing Trend Line and only goes below it once, supporting the idea of synthesis of the two previous I.O.-r used in this variation. Registration here serves as a progressive element that, in turn, establishes a norm, creates contrast, and finally synthesizes register profiles heard previously.

Variation II can be called a variation of synthesis (and even closure). It starts in close position as the Theme and the Variation I, but this time the I.O. = A^2 . This is significant since it provides different texture using the same close position. A^2 and A^3 are alternated throughout the whole variation. The return to I.O. = A is found in the middle of the first half of the second section; this once again supports the unstable, transitional characteristic of this phrase through the use of A^2 , A^3 and A in quick succession.

The Overall Deviation from Pitch Average Line (O.D. from P.A.L.) and Spacing Trend Line graph indicates that the lowest point of the line is once again at the end of the first half of the second section, as was the case in both the Theme and the First variation (see graph). This preserves the unity between each variation, in spite of the difference in texture created by the alterations of Instrumental Ordering and registration. Second, Variation II can be seen as the synthesis of the Theme and Variation I spacing norms. As mentioned previously, the Theme's O.D from P.A.L. line moves up and down mostly below the Spacing Trend Line, while the first Variation's O.D. from P.A.L. line moves in the same fashion, but mostly over the Spacing Trend Line. Variation II then, equalizes the movement above and below the Spacing Trend Line, which provides balance. This idea of synthesis can also be seen in the second half of the second section. The Theme ends in close position while Variation I ends in open position. More over, the second half of the second sections of both Theme and Variation I feature close position and open position respectively. In the second section's second half of this Variation II, the synthesis can be observed in the way of an arch. Here it starts in close position and gradually converts to open position, which then, moves back to close position at the very end.

Variation III lies in the middle of the whole movement. It starts and ends with I.O. = A in close position. This variation stands out because of its difference from the others in the Pitch Line graph. This difference can also be observed in the movement of the Pitch Average Line, which presents the least stable among all Variations, Theme and Coda, regarding space and time. The transitional function of the second section's second half is undoubtedly seen. Here, the first violin and second violin pitch lines trade

positions back and forth, providing rapid successions of Instrumental Orderings = A and B. Also the viola pitch line disappears for a while which results in I.O. = a, reinforcing the transitional gesture. More over, the entire Variation III could be called a variation of transition towards climax, which is also reinforced by the fact that the next variation features the major mode (key of G major). In other words, this variation provides the transition to the climax, and then the closure needed to begin the next variation in the major key.

The latter half of the second section starts incomplete (I.O. = a) to then finish complete in close position. Also, it mirrors the ending of the previous variation, although this time the change from close position to open position and back to close position happens rapidly in the last two measures. The O.D. from P.A.L and Spacing Trend Line graph emphasizes the difference between this variation and the previous two as well as the Theme. The O.D. from P.A.L does not reach its lowest point in the first half of the second section (even though the cello pitch line does move to the lowest pitch at this point). Moreover, it provides contrast to the previous and following variations, since it remains mostly over the Spacing Trend Line.

Variation IV is similar in I.O.-r to Variation II, starting and ending in close position. Once again the cello pitch line moves over the viola pitch line (I.O. = A²) for most of the variation, and the first violin pitch line becomes more active than the other three pitch lines (V2, Va, Vc). The last two measures of this variation feature the standard Instrumental Ordering (A). At this point, the P.A.L appears again very stationary, and it gradually moves to a slightly higher register.

The O.D from P.A.L. line appears generally below the Spacing Trend Line. Here, however, it differs from Variation I and II since it does not reach the lowest point at the end of the first half of the second section; in fact, the transitional function of this first half is not reinforced with the manipulation of I.O.-r. This reinforces the fact that this variation is more stable than the others.

Variation V presents mostly $I.O = A$ although there are two instances where $I.O. = A^2$ appears. It starts in open position and finishes in close position. The P.A.L. is once again presented in a relatively stationary manner, but this time, it moves to a slightly lower register at the very end. Just as Variation II is similar to Variation IV, this Variation V seems to be based on similarities and inversions of Variation I. First of all, the O.D. from P.A.L. and Spacing Trend Line graph provides a similarity. Here once again the O.D from P.A.L. line remains primarily over the Spacing Trend Line, having its lowest point once again at the end of the first half. The inversions are also easily seen. This Variation starts in open position and ends in close position, while Variation I starts in close position and ends in open position. Also, the cello pitch line appears to be independent from the other three pitch lines, while Variation I presents a first violin pitch line independent from the other three pitch lines.

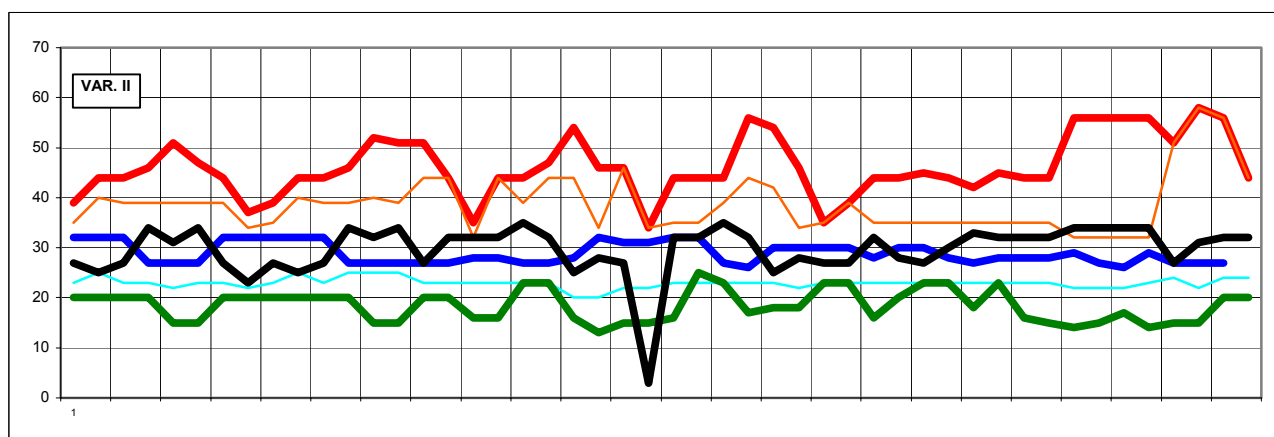
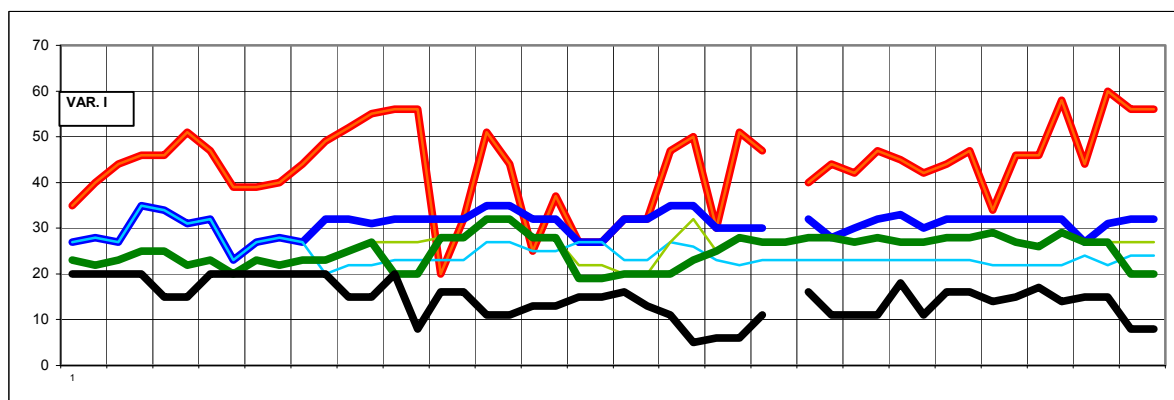
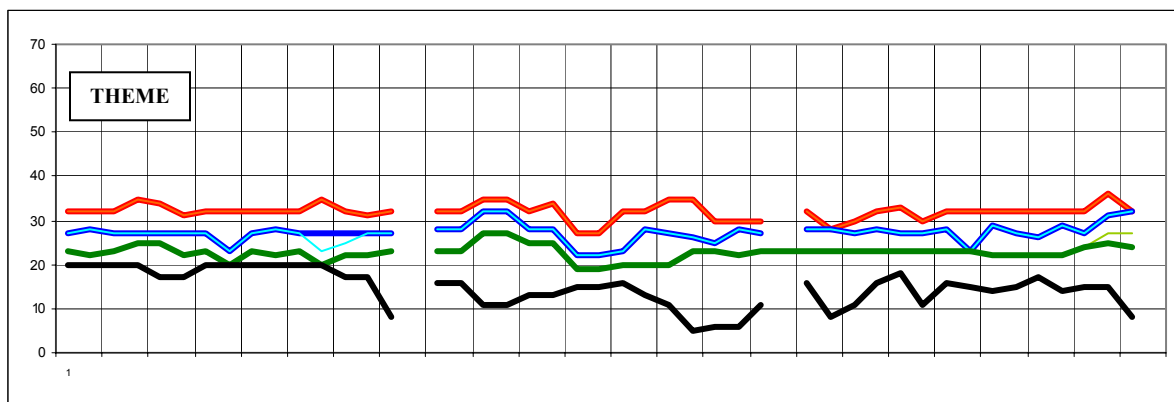
The unstable gesture of the first half of the second section is once again in this variation. The cello pitch line remains motionless in the first section and then begins to move in the second section. Also, the three upper lines (V1, V2 and Va) move to a very close position, reinforcing the change in I.O.-r. The latter part of the second section presents two small instances where $I.O. = A^2$. This provides a nice synthesis for this last

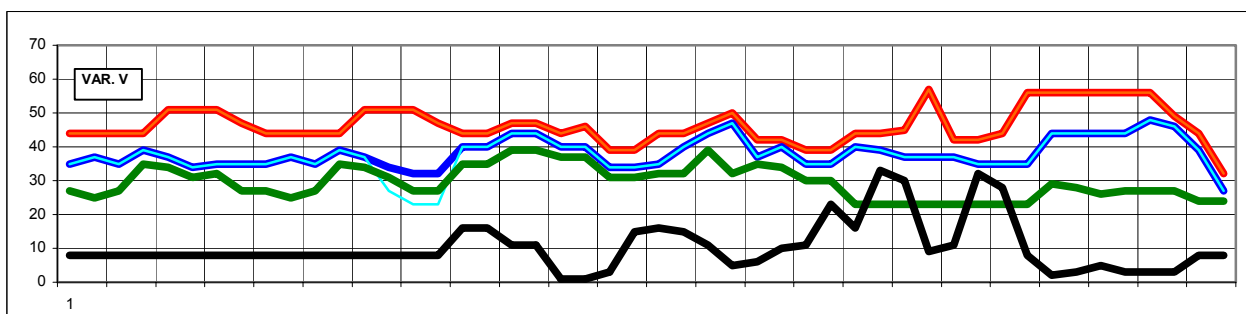
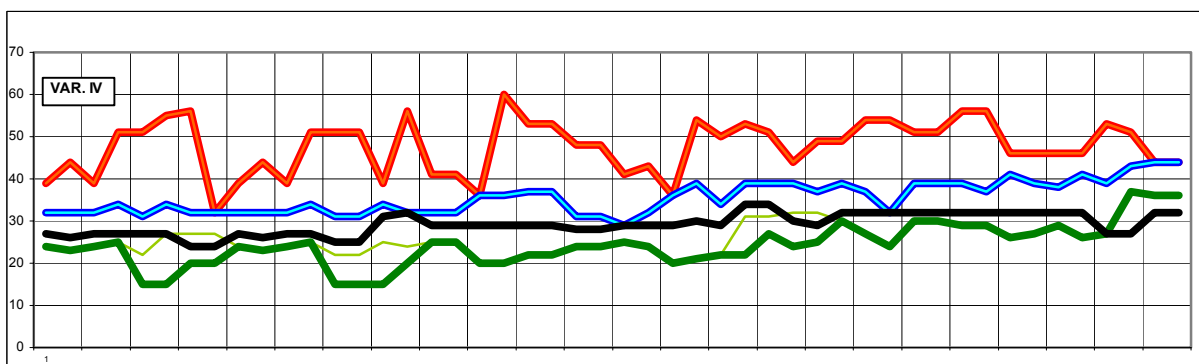
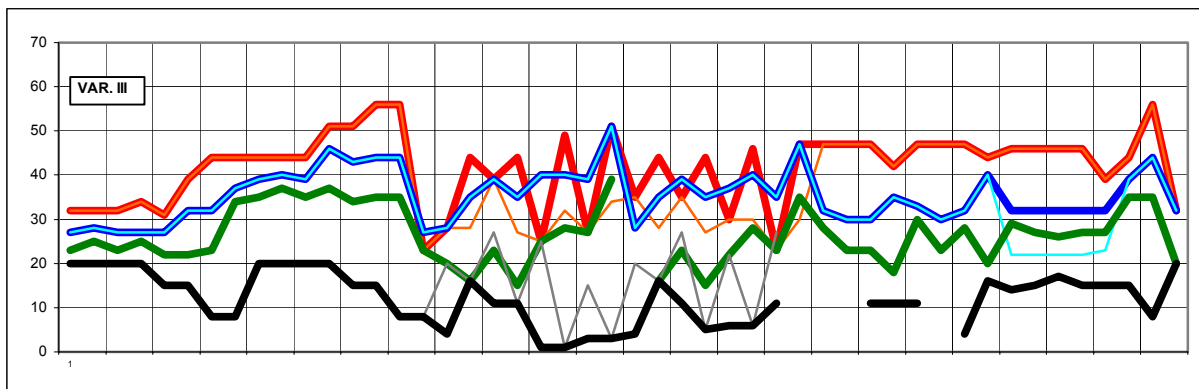
variation since it combines changes in Instrumental Ordering, Registration and spacing (close position-open position-close position).

The Coda is primarily in close position. The last two measures, however, are stated in open position. This is nicely set up in the previous measures by giving an episode in close position at a high register, and then an episode in close position in a low register. The Pitch Average Line (P.A.L.) provides the so-called synthesis that is often used for closure. This P.A.L. remains steady (which is the characteristic of variations I, II, IV and V), moving to a higher register (which is greatly used in Variation III), to then come back to the previous register in steady fashion (which is the Theme's main feature). The O.D from P.A.L. remains primarily below the Spacing Trend Line as it is seen in the Theme. At the end, this O.D from P.A.L. line moves above the Spacing Trend Line to once again close the movement with synthesis.

The Overall Deviation from Pitch Average Line (O.D. from P.A.L.) and Spacing Trend Line graph offers an interesting arch shape. This is reinforced by the fact that the piece reaches its climax in the third variation (in the middle of the movement) and then gradually moves back to the initial I.O.-r of the theme using the I.O.-r of variations II and I in variation IV and V respectively, to come back and finish the movement.

SCHUBERT D.810, No. 14, Andante con moto





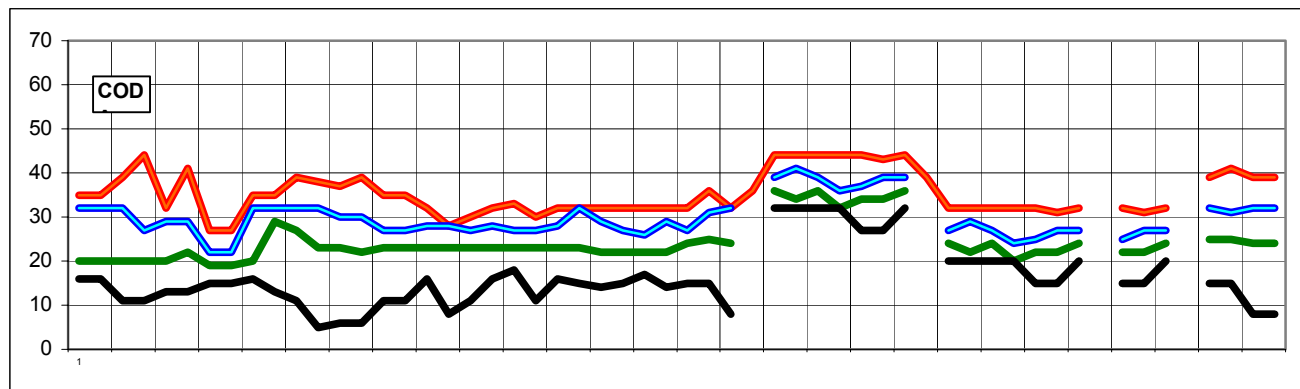
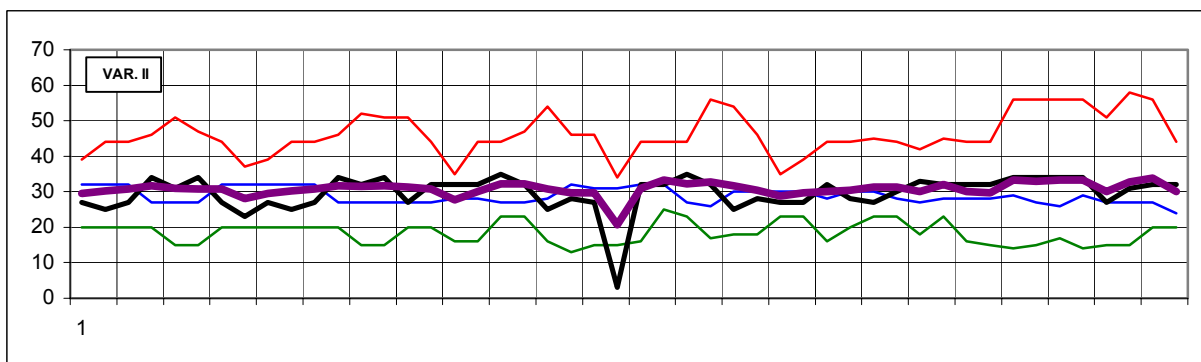
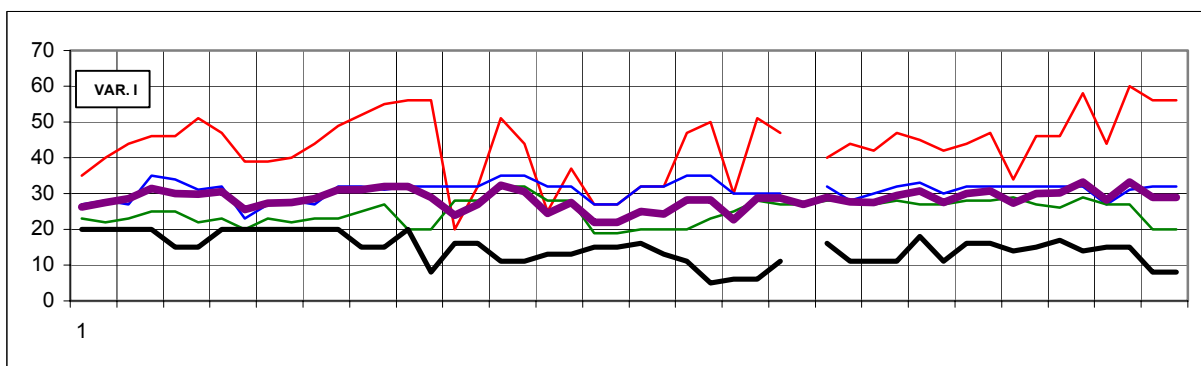
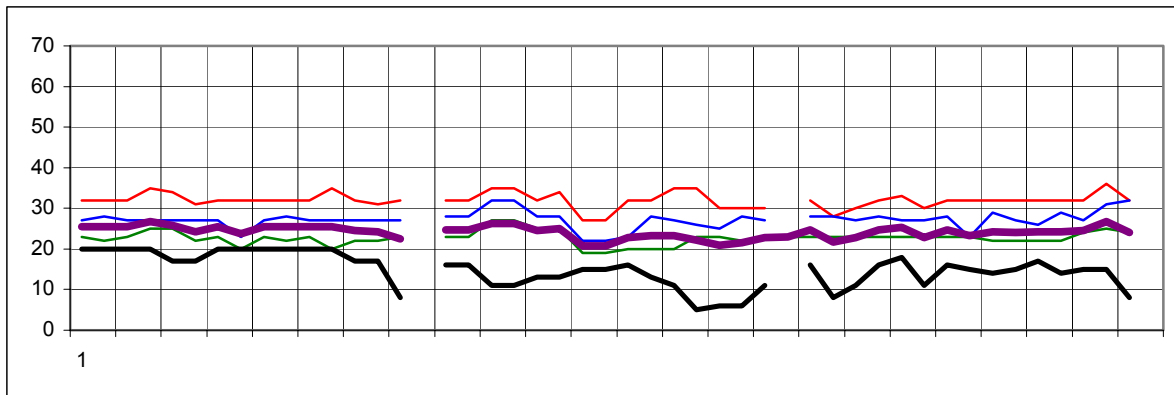
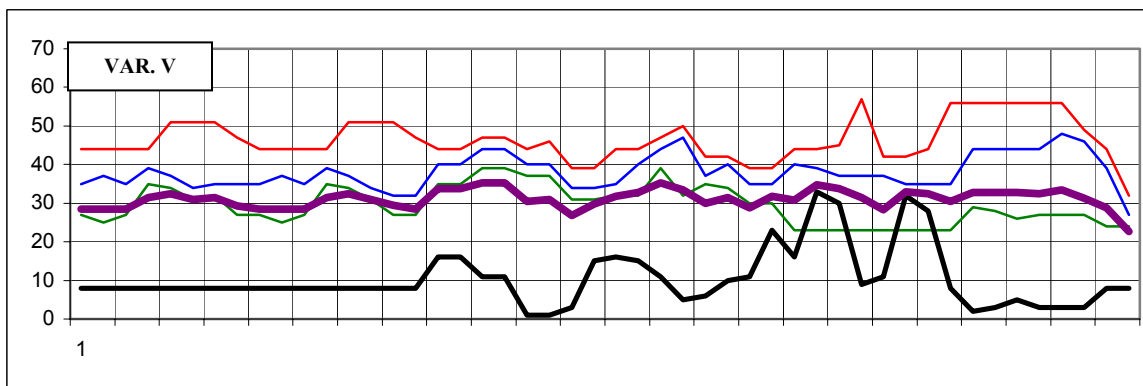
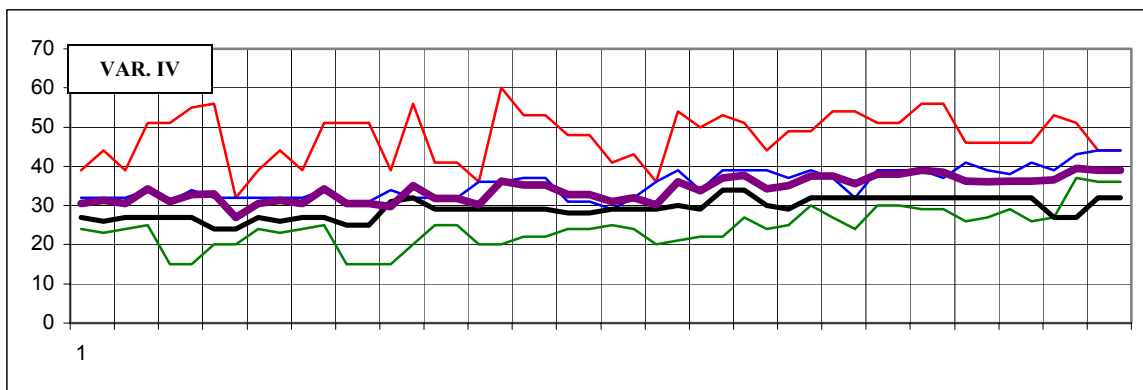
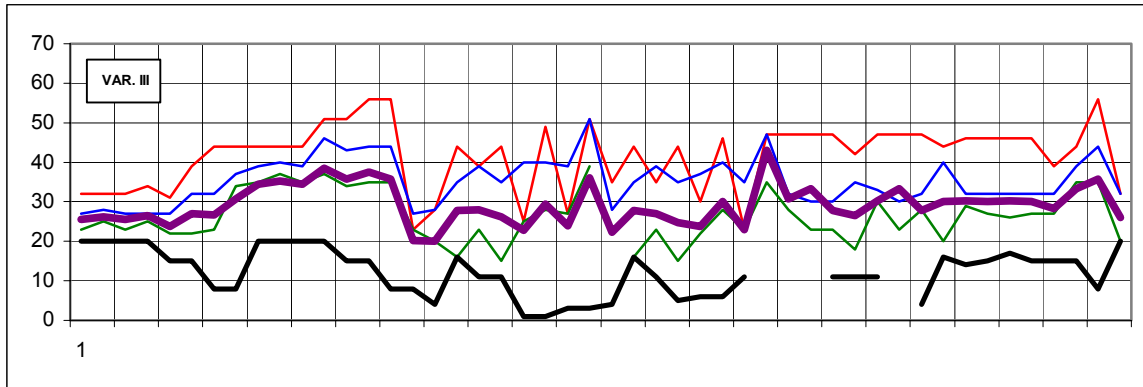


Fig. 31. Schubert Pitch Line

SCHUBERT PITCH AVERAGE LINE (P. A. L.)





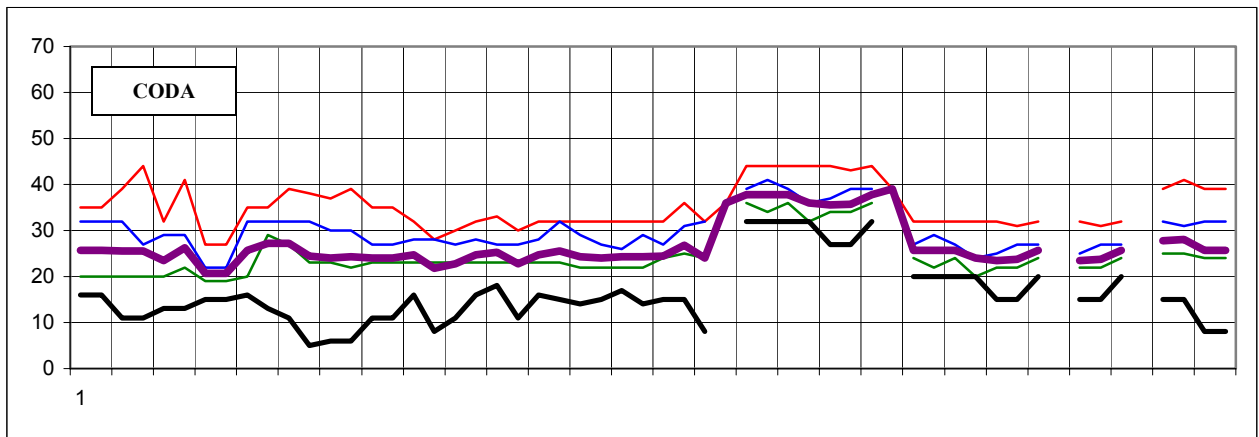


Fig. 32. Schubert P.A.L.

OVERALL DEVIATION FROM PITCH AVERAGE LINE (O.D. from P.A.L.) AND SPACING TREND LINE

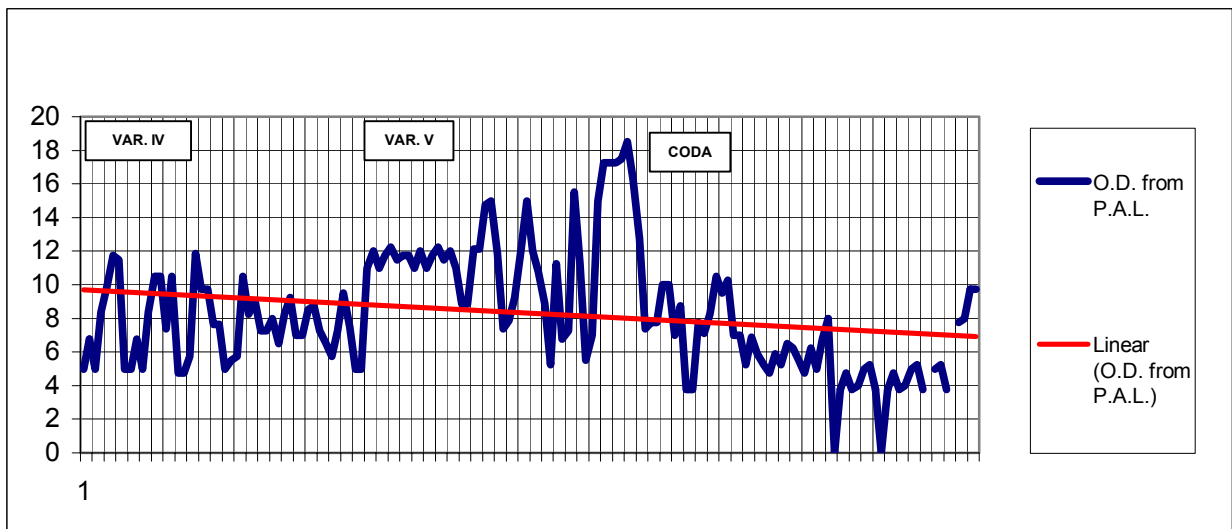
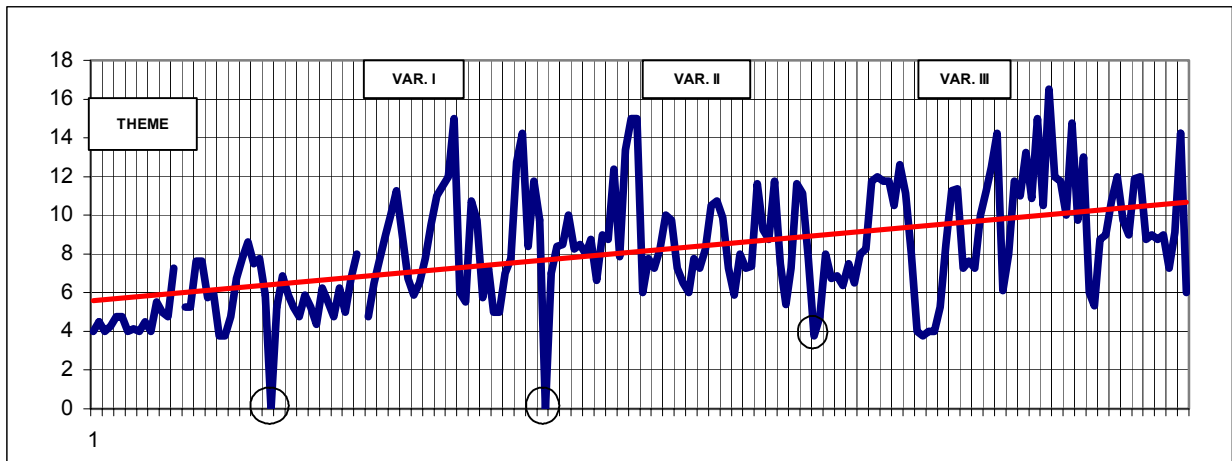


Fig. 33. Schubert O.D from P.A.L.

CONCLUSIONS

The analysis of Instrumental Ordering and registration (I.O.-r) in these four movements corroborates this technique of analysis as a viable approach. Furthermore, a comparison between them provides the means by which to suggest conclusions regarding the manipulation of I.O. and I.O.-r.

Specific I.O.-r as main characteristic of an episode

This is undoubtedly supported by Schubert's theme and variations. Here, each variation appears to have a specific manipulation of I.O.-r, which differentiates one from the other, and also, relates one to the other. Therefore, Variation V seems to be the textural inversion of Var. I, Var. IV is similar to Var. II, the coda is similar to the theme, although with some elements of synthesis of I.O.-r, and Var. III is independent because of its different textures.

I.O. = A as stable element.

First of all, the most obvious of all conclusions is the use of the "A" Instrumental Ordering. This ordering, standard in the string quartet due to instrumental ranges, provides the strongest stable texture (and color) in string quartet writing. Because of its stability, this standard Instrumental Ordering is also commonly found at the end of a musical work.

I.O. = A with different registrations (I.O.-r)

Variations in register are commonly made while maintaining the same standard Instrumental Ordering.

These changes are usually found to provide development. However, rapid changes of registration usually signal unstable gestures, which can be used in transitional passages. Bartok, however, uses these rapid changes within stable passages (13-15).

These changes in register can also provide preparation for upcoming structural episodes. This is the case in Barber. Here, a norm of registration has been set at the beginning of the movement (in the middle-low register). After the climax, which is stated in the high register with I.O. = A, the pitch lines are immediately brought to the low register, while preserving I.O. = A. This happens in the re-transition (which is reinforced by other musical aspects), setting up the return to the norm (middle-low range) in a very effective way.

I.O. = A¹ as common substitution for I.O. = A

A and A¹ are similar in that Violin I and the Cello occupy the respective highest and lowest positions within the overall range. This enables the composer to relate these otherwise contrasting orderings one to the other. Usually, A¹ substitutes for A in expository gestures through quick alternations. However, A¹ could also be seen as a transitional element or used in developmental fashion – especially if it is used for relatively long period of time.

I.O. = A² and A³ as common developmental device

This Instrumental Ordering is one of the most used by these composers to create development. The viola takes the role of the cello (standard lowest pitch line) while the cello takes a more prominent role regarding melodic importance. This is clearly corroborated in Barber and Schubert. The second section in Barber features the cello with the main melodic line. Here A³ is used which brings the viola line to the lowest

register, taking over the cello's primary bass-line role. Schubert writes two entire variations (II and IV) using these Instrumental Orderings. Variation II is especially interesting since it alternates both I.O.'s.

I.O. = A⁴ and A⁵ as unstable orderings

These two Instrumental Orderings have the two violins (V1 and V2) in the outer voices. They were mostly found for transitional purposes in these four analyses and seem to be rarely used in stable gestures. Barber uses these two I.O. types in the final progression towards the climax, which is reached in standard I.O. = A.

I.O. = B as transitional device

Instrumental Ordering type B is often found in transitional gestures. Moreover it can be used for the overlapping of structural functions. These two applications are found prominently in Haydn. In the development of the first section, the final Instrumental Ordering is B (see fig. 21. Synthesis). This provides an overlapping of functions, which then is carried out in the next structural progression (transition). At this point, the transition begins with B as starting I.O. In the re-transition of the second section, I.O. = b and B are used to reinforce the unstable gesture, ending with I.O. = B before the third section.

I.O. = B and B¹ as an element of synthesis

Instrumental Orderings type B allow composers to create synthesis, especially in works that use the manipulation of I.O. (when I.O. = A is set as the only stable ordering) as a major factor in the structural progression. I.O. = B and B¹ provide then, a strong element of synthesis, since they both keep the cello as the lowest sounding voice. Thus,

Barber achieves synthesis by using B¹ as the fusion of the manipulations of Instrumental Ordering in this Adagio.

Manipulation of register as a device to set up changes of spacing (close/open position)

Instances where changes of spacing appear smooth are usually set up by contrast of registration. This can be seen in the coda from Schubert's theme and variations. Here, the last open position chord is set up by an episode in close position in a relatively high register, followed by an episode in close position in a low register. This technique smoothly sets up these changes in spacing, and synthesizes two contrasting range profiles to reinforce closure.

Observations concerning methodology:

The graphs. The Pitch Line graph provides a fast and easy reading of the overall shape of any movement once the method is assimilated. However, in cases such as Bartok and Schubert, where two or more horizontal pitches were chosen for each measure, the graphs become very lengthy. Choosing the number of horizontal pitches to be shown per measure is somewhat subjective. However, it should be done upon strong musical reasons such as harmonic rhythm, emphasized pitches and implied linear movement. Despite this, the number of horizontal notes chosen will not significantly impact the overall reading of the graph since the resultant lines will have a similarity of movement regardless of the detail.

The Pitch Average Line (P.A.L.) graph provides an important overview of the changes in registration. However, this graph is limited since it does not provide the spacing

differences that are present. These differences are then clearly represented in the O.D. from P.A.L. and Spacing Trend Line graph.

The Overall Deviation from Pitch Average Line (O.D. from P.A.L.) and Spacing Trend Line graph provides a fair representation of the structural progression. The Spacing Trend Line suggests a norm of spacing throughout a movement or episode, which along with the O.D. from P.A.L., represents best the changes in registration and spacing.

Despite of the previous affirmations, it can be inferred from these four analyses that not all movements or episodes need these three graphs in order to obtain an accurate analysis of the ongoing structural changes. In other words, a composer may choose to rely in the manipulation of only one aspect of I.O-r to reinforce the other musical parameters (harmony, melody, rhythm, etc), which then will produce the desired structural changes.

The third movement of Bartok's String Quartet No. 1 is particularly interesting because the Pitch Average Line (P.A.L.) graph and the Overall Deviation from Pitch Average Line (O.D. from P.A.L.) and Spacing Trend Line graph are not of such important use as they are in the other three movements (analyses). This, however, does not mean that these graphs (P.A.L. & O.D. from P.A.L.) are not significant, but it does suggest that Bartok (at least in this movement) relies more in the handling of different Instrumental Orderings to create, support or provide balance in the ongoing structural progression. This is reinforced by the fact that this movement is an organic movement, which means that Bartok introduces a theme with different characteristics. These differences impact the Instrumental Ordering, providing different types of them (as can be seen in rehearsal numbers 0-4), which then are combined and developed throughout

the movement. Thus, the pitch line graph provides an accurate analysis of the music, since it best illustrates these changes in Instrumental Ordering. However, both P.A.L. graph and O.D. from P.A.L. and Spacing Trend Line graph can be used to support decisions made by the reading of the Pitch Line graph. This information is not enough to suggest that Bartok deals primarily with manipulation of different Instrumental Orderings (since more analyses would be needed to verify it), but it does suggest that movements that are called “organic” might feature this treatment with successful musical results.

On the other hand, Schubert’s *Andante con moto* (theme and variations) from the String Quartet No. 14 stands in contrast to Bartok, since here all three graphs are of same importance. Moreover, these graphs reinforce and complement each other, providing an exact and accurate reading of the structural progression. As in Bartok, this information does not suggest that this is Schubert’s characteristic treatment of string quartet writing. However, it can be inferred that movements or episodes where other musical parameters (such as harmony) are fixed or limited, as is the case of a Theme and Variations form, provide a major impact in the manipulation of Instrumental Ordering and Registration, as this movement prominently corroborates it.

Terminology: There is ambiguity in using A, B, C and D as labels for Instrumental Ordering types since these letters are normally associated with formal designations. To resolve this problem, the letters do not name the divisions of the music, but instead, the word *section* names them. Thus, a ternary form should be divided into first section, second section and third section to avoid the ambiguity of terms.

Even though the results of testing this method of analysis have been positive, there are a number of issues yet to be addressed. It is important to realize that more analyses of string quartets by these and other composers should be made in order to construct a more comprehensive system. Thus, there are two important approaches that should be considered for further investigation.

One is to examine the output of a single composer. Comprehensive study of the complete quartets of a single composer, such as Beethoven or Bartók, would allow for the study of stylistic tendencies and development relative to I.O. – r.

Another approach would be to examine the manipulation of Instrumental Ordering- Registration according to the evolution of the string quartet. This should be done chronologically, and it should encompass composers such as Haydn, Mozart, Beethoven, Mendelssohn, Shostakovich, and Bartók. For this approach, one quartet of each set of string quartets written by each composer might be analyzed with the goal of developing a progressive mapping of the use of I.O. – r as a structural element.

APPENDIX

SCORES

STRING QUARTET OP.11, *MOLTO ADAGIO*
Samuel Barber

II

Molto adagio

pp *pp espr. cantando*

pp *p* *p*

pp *pp* *p* *p*

mf *p* *mf* *p* *mf*

pp espr. cantando *mf*

p *p* *mf*

piu f sempre cantando

p *mf*

12 23

Musical score system 1, measures 12-23. It features a piano (p) introduction in the left hand and a melody in the right hand that begins with a mezzo-forte (mf) dynamic. The score is written in a key with two flats and a 2/4 time signature.

22

3

Musical score system 2, measures 24-33. This system is marked with a circled '3'. It includes dynamic markings such as piano (p), pianissimo (pp), and mezzo-forte (mf). Performance instructions include 'p cresc. espr. cantando' and 'mf'. The right hand features a melodic line with slurs and ties.

34

with increasing intensity

4

Musical score system 3, measures 34-43. This system is marked with a circled '4' and includes the instruction 'with increasing intensity'. Dynamics range from piano (p) to mezzo-forte (mf) and mezzo-forte espressivo (mf espr.). Crescendo markings (cresc.) are used to indicate the build-up of intensity.

40

Musical score system 4, measures 44-53. This system features a forte (f) dynamic and includes the instruction 'sul G' (sul G string). The right hand has a melodic line with slurs and ties, while the left hand provides harmonic support.

45 13

cresc. sempre
cresc. sempre
cresc. sempre f espr.
cresc. sempre

Detailed description: This system contains four staves of music. The top staff has a treble clef and a key signature of three flats. It features a melodic line with a long slur and a crescendo hairpin. The second staff has a treble clef and a similar melodic line. The third staff has a treble clef and a more rhythmic line. The bottom staff has a bass clef and a simple harmonic accompaniment. Dynamics include *cresc. sempre* and *f espr.*

50 5

ff *ff* *pp*
ff *ff* *pp*
ff *ff* *pp*
ff *ff* *pp*

Detailed description: This system contains four staves of music. The top staff has a treble clef and a key signature of three flats. It features a melodic line with a long slur and a crescendo hairpin. The second staff has a treble clef and a similar melodic line. The third staff has a treble clef and a more rhythmic line. The bottom staff has a bass clef and a simple harmonic accompaniment. Dynamics include *ff* and *pp*.

Tempo I° 60 6

mf espr. *p*
mf espr. *p*

Detailed description: This system contains four staves of music. The top staff has a treble clef and a key signature of three flats. It features a melodic line with a long slur and a crescendo hairpin. The second staff has a treble clef and a similar melodic line. The third staff has a treble clef and a more rhythmic line. The bottom staff has a bass clef and a simple harmonic accompaniment. Dynamics include *mf espr.* and *p*.

23 65

p *molto espr.* *pp*
più p *pp* *morendo*
p *pp* *morendo*
più p *pp* *morendo* *attacca*

Detailed description: This system contains four staves of music. The top staff has a treble clef and a key signature of three flats. It features a melodic line with a long slur and a crescendo hairpin. The second staff has a treble clef and a similar melodic line. The third staff has a treble clef and a more rhythmic line. The bottom staff has a bass clef and a simple harmonic accompaniment. Dynamics include *p*, *molto espr.*, *pp*, *più p*, and *morendo*. The system ends with the instruction *attacca*.

STRING QUARTET OP. 76 No. 4, ADAGIO
Franz Joseph Haydn

12

Adagio

II

13

14

Musical score for measures 14-15, system 1. The system contains two staves: piano (left) and violin (right). The piano part features a melodic line with dynamic markings *p*, *f*, and *sfz*. The violin part has a more active line with slurs and accents. Measure numbers 14 and 15 are indicated at the beginning of the system.

Musical score for measures 16-17, system 2. The system contains two staves: piano (left) and violin (right). The piano part continues with dynamic markings *p*, *f*, and *sfz*. The violin part has a more active line with slurs and accents. Measure numbers 16 and 17 are indicated at the beginning of the system.

Musical score for measures 18-19, system 3. The system contains two staves: piano (left) and violin (right). The piano part continues with dynamic markings *p*, *f*, and *sfz*. The violin part has a more active line with slurs and accents. Measure numbers 18 and 19 are indicated at the beginning of the system.

Musical score for measures 20-21, system 4. The system contains two staves: piano (left) and violin (right). The piano part continues with dynamic markings *p*, *f*, and *sfz*. The violin part has a more active line with slurs and accents. Measure numbers 20 and 21 are indicated at the beginning of the system.

15

Musical score for measures 22-23, system 5. The system contains two staves: piano (left) and violin (right). The piano part continues with dynamic markings *p*, *f*, and *sfz*. The violin part has a more active line with slurs and accents. Measure numbers 22 and 23 are indicated at the beginning of the system.

Musical score for measures 24-25, system 6. The system contains two staves: piano (left) and violin (right). The piano part continues with dynamic markings *p*, *f*, and *sfz*. The violin part has a more active line with slurs and accents. Measure numbers 24 and 25 are indicated at the beginning of the system.

Musical score for measures 26-27, system 7. The system contains two staves: piano (left) and violin (right). The piano part continues with dynamic markings *p*, *f*, and *sfz*. The violin part has a more active line with slurs and accents. Measure numbers 26 and 27 are indicated at the beginning of the system.

Musical score for measures 28-29, system 8. The system contains two staves: piano (left) and violin (right). The piano part continues with dynamic markings *p*, *f*, and *sfz*. The violin part has a more active line with slurs and accents. Measure numbers 28 and 29 are indicated at the beginning of the system.

STRING QUARTET OP. 7 No. 1, III ALLEGRO VIVACE
Béla Bartók

20

meno vivace

poco agitato

meno vivace

poco agitato

meno vivace

poco agitato

meno vivace

poco agitato

meno vivace

poco agitato

21

Allegro vivace 1. mar.

poco più mosso

Allegro vivace 1. mar.

poco più mosso

Allegro vivace 1. mar.

poco più mosso

Allegro vivace 1. mar.

poco più mosso

Allegro vivace 1. mar.

poco più mosso

22

Allegro vivace 1. mar.

poco più mosso

Allegro vivace 1. mar.

poco più mosso

Allegro vivace 1. mar.

poco più mosso

Allegro vivace 1. mar.

poco più mosso

Allegro vivace 1. mar.

poco più mosso

222

poco più mosso (3)

39

ritard. (4) *a tempo*

44

(5)

49

sempre cresc.
sempre cresc.
sempre cresc.

(6)

54

(7)

59

(8)

cresc. molto
cresc. molto
cresc. molto

64

ritard. (9) *a tempo*

69

molto ritard. (9) *a tempo*

pp molto dim.
pp molto dim.
pp molto dim.
pp molto dim.
pp molto dim.
pp molto dim.
pp espress.

182 28

182 28

pp
pppp

grazioso

186 (19)

186 (19)

pp

190

190

194 (19)

194 (19)

ppp

176

176

pizz.

179 (20)

179 (20)

p
arco

p grazioso

182

182

186

186

poco
a
cresc.
poco

30

198
199
200
201
202
203
204

21

192 (21)
193
194
195
196
197
198
199
200

22

195
196
197
198
199
200
201
202
203 (22)

23

190
191
192
193
194
195
196
197
198
199
200

24

204
205
206
207
208
209
210
211
212

25

209 (25)
210
211
212
213
214
215
216
217

26

212
213
214
215
216
217
218
219
220 (26)

27

210
211
212
213
214
215
216
217
218

326
330 Più vivo J. = 04
333 Più vivo J. = 04

mf, *f*, *sf*, *impetuoso*

335

sf, *mf*, *f*, *impetuoso*

310

sf, *mf*, *f*, *impetuoso*

315

sf, *mf*, *f*, *impetuoso*, *riliardi molto*

320 Adagio J. = 06

mf, *p*, *sf*, *molto riliardi*, *Più largo J. = 06*, *Adagio tremolo*

327

p, *mf*, *sf*, *Tempo I. J. = 06*

332

p, *mf*, *sf*, *poco cresc.*

338

sf, *mf*, *f*, *subito*, *arco*

STRING QUARTET D.810 No. 14. *ANDANTE CON MOTO*
Franz Schubert

Musical score for strings 1-4, measures 20-310. The score is divided into four systems, each with four staves. The first system (measures 20-30) includes dynamics *pp*, *f*, and *pp*. The second system (measures 30-39) includes *pp* and *f*. The third system (measures 39-48) includes *pp*, *f*, and *pp*. The fourth system (measures 48-57) includes *pp*, *f*, and *pp*. The fifth system (measures 57-66) includes *pp*, *f*, and *pp*. The sixth system (measures 66-75) includes *pp*, *f*, and *pp*. The seventh system (measures 75-84) includes *pp*, *f*, and *pp*. The eighth system (measures 84-93) includes *pp*, *f*, and *pp*. The ninth system (measures 93-102) includes *pp*, *f*, and *pp*. The tenth system (measures 102-111) includes *pp*, *f*, and *pp*. The eleventh system (measures 111-120) includes *pp*, *f*, and *pp*. The twelfth system (measures 120-129) includes *pp*, *f*, and *pp*. The thirteenth system (measures 129-138) includes *pp*, *f*, and *pp*. The fourteenth system (measures 138-147) includes *pp*, *f*, and *pp*. The fifteenth system (measures 147-156) includes *pp*, *f*, and *pp*. The sixteenth system (measures 156-165) includes *pp*, *f*, and *pp*. The seventeenth system (measures 165-174) includes *pp*, *f*, and *pp*. The eighteenth system (measures 174-183) includes *pp*, *f*, and *pp*. The nineteenth system (measures 183-192) includes *pp*, *f*, and *pp*. The twentieth system (measures 192-201) includes *pp*, *f*, and *pp*. The twenty-first system (measures 201-210) includes *pp*, *f*, and *pp*. The twenty-second system (measures 210-219) includes *pp*, *f*, and *pp*. The twenty-third system (measures 219-228) includes *pp*, *f*, and *pp*. The twenty-fourth system (measures 228-237) includes *pp*, *f*, and *pp*. The twenty-fifth system (measures 237-246) includes *pp*, *f*, and *pp*. The twenty-sixth system (measures 246-255) includes *pp*, *f*, and *pp*. The twenty-seventh system (measures 255-264) includes *pp*, *f*, and *pp*. The twenty-eighth system (measures 264-273) includes *pp*, *f*, and *pp*. The twenty-ninth system (measures 273-282) includes *pp*, *f*, and *pp*. The thirtieth system (measures 282-291) includes *pp*, *f*, and *pp*. The thirty-first system (measures 291-300) includes *pp*, *f*, and *pp*. The thirty-second system (measures 300-310) includes *pp*, *f*, and *pp*. The score includes the instruction *Piu mosso* and *Tempo I*. The publisher's name *B. & H. 5528* is printed vertically on the left side.

Musical score for strings 1-4, measures 10-340. The score is divided into four systems, each with four staves. The first system (measures 10-19) includes dynamics *f*, *pp*, and *pp*. The second system (measures 19-28) includes *pp*, *f*, and *pp*. The third system (measures 28-37) includes *pp*, *f*, and *pp*. The fourth system (measures 37-46) includes *pp*, *f*, and *pp*. The fifth system (measures 46-55) includes *pp*, *f*, and *pp*. The sixth system (measures 55-64) includes *pp*, *f*, and *pp*. The seventh system (measures 64-73) includes *pp*, *f*, and *pp*. The eighth system (measures 73-82) includes *pp*, *f*, and *pp*. The ninth system (measures 82-91) includes *pp*, *f*, and *pp*. The tenth system (measures 91-100) includes *pp*, *f*, and *pp*. The eleventh system (measures 100-109) includes *pp*, *f*, and *pp*. The twelfth system (measures 109-118) includes *pp*, *f*, and *pp*. The thirteenth system (measures 118-127) includes *pp*, *f*, and *pp*. The fourteenth system (measures 127-136) includes *pp*, *f*, and *pp*. The fifteenth system (measures 136-145) includes *pp*, *f*, and *pp*. The sixteenth system (measures 145-154) includes *pp*, *f*, and *pp*. The seventeenth system (measures 154-163) includes *pp*, *f*, and *pp*. The eighteenth system (measures 163-172) includes *pp*, *f*, and *pp*. The nineteenth system (measures 172-181) includes *pp*, *f*, and *pp*. The twentieth system (measures 181-190) includes *pp*, *f*, and *pp*. The twenty-first system (measures 190-199) includes *pp*, *f*, and *pp*. The twenty-second system (measures 199-208) includes *pp*, *f*, and *pp*. The twenty-third system (measures 208-217) includes *pp*, *f*, and *pp*. The twenty-fourth system (measures 217-226) includes *pp*, *f*, and *pp*. The twenty-fifth system (measures 226-235) includes *pp*, *f*, and *pp*. The twenty-sixth system (measures 235-244) includes *pp*, *f*, and *pp*. The twenty-seventh system (measures 244-253) includes *pp*, *f*, and *pp*. The twenty-eighth system (measures 253-262) includes *pp*, *f*, and *pp*. The twenty-ninth system (measures 262-271) includes *pp*, *f*, and *pp*. The thirtieth system (measures 271-280) includes *pp*, *f*, and *pp*. The thirty-first system (measures 280-289) includes *pp*, *f*, and *pp*. The thirty-second system (measures 289-298) includes *pp*, *f*, and *pp*. The thirty-third system (measures 298-307) includes *pp*, *f*, and *pp*. The thirty-fourth system (measures 307-316) includes *pp*, *f*, and *pp*. The thirty-fifth system (measures 316-325) includes *pp*, *f*, and *pp*. The thirty-sixth system (measures 325-334) includes *pp*, *f*, and *pp*. The thirty-seventh system (measures 334-340) includes *pp*, *f*, and *pp*. The score includes the instruction *Andante con moto*. The publisher's name *B. & H. 5528* is printed vertically on the left side.

22

pp
p
decresc.
p
p

23

pp
p
decresc.
p
p

24

pp
p
decresc.
p
p

25

pp
p
decresc.
p
p

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26

pp
p
decresc.
p
p

27

pp
p
decresc.
p
p

28

pp
p
decresc.
p
p

29

pp
p
decresc.
p
p

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24

60

Glockenspiel.
Cymbal.
Tambourin.

Cresc.
Cresc.

R. & H. 8328

25

70

Cymbal.
Cymbal.
Tambourin.

Cresc.
Cresc.

R. & H. 8328

26

P

molto
molto
molto
molto
molto
molto

molto

p

ppp
ppp
ppp
ppp
ppp

80

p

f

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27

90

ppp
ppp
ppp
ppp
ppp

ppp
ppp
ppp
ppp
ppp

ppp
ppp
ppp
ppp
ppp

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28

100

102

110

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29

120

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La ripetizione pueri e pueri
crescendo sino *f*

130

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140

decresc.

pp

mf

B. & H. 8528

32

Musical score system 1, measures 145-150. The system contains two staves. The upper staff features a melodic line with various note values and rests. The lower staff provides harmonic accompaniment with chords and moving lines. The measure number 150 is printed below the first staff.

Musical score system 2, measures 155-160. The system contains two staves. The upper staff has a melodic line with dynamic markings *pppp* and *pppp*. The lower staff has a rhythmic accompaniment. The measure number 160 is printed below the first staff.

Musical score system 3, measures 165-170. The system contains two staves. The upper staff has a melodic line with dynamic markings *dim.* and *pppp*. The lower staff has a rhythmic accompaniment. The measure number 160 is printed below the first staff.

Musical score system 4, measures 175-180. The system contains two staves. The upper staff has a melodic line with dynamic markings *dim.* and *cresc.*. The lower staff has a rhythmic accompaniment. The measure number 170 is printed below the first staff.

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VITA

Mauricio Oliveros-Romero was born December 24, 1979, in Cali, Colombia. He is the son of Edilberto Oliveros and Clara Ines Romero. A 1996 graduate of Colegio Americano, Cali, he received a Bachelor of Music degree with a major in violin performance from Antonio Maria Valencia Conservatory in Cali, Colombia in 2000.

He was a member of the first violin section of the Valle Symphony Orchestra during 1999-2001. After receiving his Master of Music degree in violin performance from Texas Christian University in 2004, he was offered a scholarship to pursue a Master degree in Music Theory and Composition from the same prestigious institution.

While working on his degree, he remained active in the performance of the violin, participating in ensembles such as TCU Symphony Orchestra, TCU New Music Ensemble, a string quartet through the TCU chamber music program, and the San Angelo Symphony Orchestra.

INSTRUMENTAL ORDERING-REGISTRATION
AS STRUCTURAL PROGRESSION IN STRING QUARTETS

This thesis proposes that ongoing change in Instrumental Ordering and registration (I.O. – r) can be used to create and/or reinforce structural progression in music. I.O.-r is defined as the arrangement of the instruments in their respective ranges relative to each other. Specific study will be made of works written for string quartet where the composers reinforce structural (introductory, expository, developmental, transitional, closure) progression within or between movements by varying I.O. - r, thus creating new textures that help emphasize and support these changes.

Samuel Barber (1910-1981) used this technique to help gradually build toward the climax in the second movement of his String Quartet, Op.11. Franz Schubert (1797-1828), in the second movement of his Op. posth. String Quartet in D minor (*Death and the Maiden*), established a specific use of different I.O.-r for each variation. Franz Joseph development and transition by alternating incomplete and complete gestures and, in doing so, provides contrast with the relative I.O. – r stability found in areas of exposition and closure. Béla Bartok (1881-1945) reinforces structural progression or provides balance by the manipulation of I.O.-r.

This system provides a method for analyzing String Quartet composition and presents the information in a simple but effective way through the use of linear graphs. As a result of such analysis, musicians might better understand form and structural progression (in a movement, or even a complete quartet) and revisit other musical parameters, such as melody and harmony, in a textural context.