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Symmetry and Interval Cycles in the Quartettos of Mario Davidovsky

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SYMMETRY AND INTERVAL CYCLES IN THE QUARTETTOS
OF MARIO DAVIDOVSKY

by

INÉS THIEBAUT LOVELACE

A dissertation submitted to the Graduate Faculty in Music in partial fulfillment of the
requirements for the degree of Doctor of Philosophy, The City University of New York

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Inés Thiebaut Lovelace

This Manuscript has been read and accepted by the Graduate Faculty in Music in satisfaction of the Dissertation requirement for the degree of Doctor of Philosophy.

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ABSTRACT
Symmetry and Interval Cycles in the Quartettos of Mario Davidovsky

by
Inés Thiebaut Lovelace

Advisor: Distinguished Professor Joseph Straus

The music of Mario Davidovsky has seldom been analyzed past the timbral implications of his electroacoustic pieces and gestural aspects of his phrasing, and there has been virtually no attention paid to its pitch organization, despite the composer’s longstanding interest in writing for acoustic instruments. In this dissertation, I demonstrate how two main consistent resources for the organization of pitch govern the musical continuity and formal structure of his music, what I’ve called symmetry potentiality–actuality, and interval cycle potentiality–actuality processes. The interval cycle potentiality–actuality process refers to the various interval cycles that self-perpetuate, completing aggregates. This self-perpetuation means that incomplete cycles will consistently be understood as longing for the pitch that will fulfill the cycle’s potentiality for completion. The symmetrical potentiality–actuality process refers to asymmetrical collections that will consistently long for the pitch that will fulfill their symmetrical potentiality, also completing aggregates in the process.

Both of these processes will be explored thoroughly in the context of Davidovsky’s Quartettos No.1—No.4 in Chapter Two (symmetrical processes) and Chapter Three (interval cycle processes). Chapter Two will also include a study of asymmetrical collections with particularly interesting degrees of near-symmetry. The degree of near-symmetry measures, so to speak, the effort required of an asymmetrical collection to become symmetrical by moving one
of its voices parsimoniously within its own cardinality \( n \) (e.g., asymmetrical tetrachord becoming a symmetrical tetrachord), or that of becoming symmetrical within the cardinality \( n+1 \) by introducing a particular pitch (e.g., asymmetrical tetrachord becoming a symmetrical pentachord). The degree of near-symmetry, in essence, allows us to determine how strong the collection’s potentiality for symmetry is—a valuable property when studying Davidovsky’s music.
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My wife, Amy, who has been with me, and for me, always willing, always present, always proofreading, always loving. Her name should be on this project with mine.
To my sister, Blanca, whose courage is beyond this world: I am so grateful to be finishing the last few words of this dissertation by your side.
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CHAPTER ONE

Davidovsky’s Organicism And Musical Continuity

Unlike the more theoretically inclined serial composers of the immediate post-war generation, Davidovsky rarely speaks about the internal dynamics of his pitch structures, and has never written about them. Several of his students have said that his descriptions of his own music are usually metaphorical, and in conversations with the composer, I’ve encountered a reluctance to discuss technicalities. When asked directly, the composer firmly states that he is not a serial composer. This is quite significant, as his music is aggregate-based but not serial, an important distinction since it is nevertheless based on a principle of ordering—an ordering based on a cyclical conception of the aggregate, rather than a series. The resistance to disclosing the internal dynamics of pitch structures in his music, which govern its musical continuity and formal design, might be one of the reasons why analyses of Davidovsky’s music are rare, and why the majority of those use musical metaphors rather than technical language, and usually address phrasing and gesture alone, rather than harmonic organization. I will not set aside Davidovsky’s metaphors, for they indeed help us approach the music in meaningful ways, yet his metaphors can also be assigned to the complex internal dynamics of the pitch structures that govern his compositional method.

The journey, in fact, starts with a metaphor, what Davidovsky refers to as polyphony-of-space. The composer conceives of this idea by analogy with our position in the universe: there are multiple sources of energy (light waves), traveling from multiple distances (the different stars in our universe), arriving at a single point in time (to him, watching the night sky in a particular moment). There are two applications of this metaphor in his music. In the first one, à la Carter, the different instruments/lines impersonate the different light waves, traveling independently yet
together through the time and space of the composition—in this conception, the *polyphony-of-space* is about coordinating independent but coexisting forces or actors in the musical continuity. This is the application of the metaphor that has led theorists and composers to describe Davidovsky’s music largely from the perspective of phrasing and gesture. One cannot deny Davidovsky’s gestural approach to composition, especially taking into full consideration the lessons he learned in the electronic music studio. His gestures follow, more often than not, the attack–sustain–decay scheme so important in the study of individual sounds. And one cannot deny that this application of the metaphor can yield very interesting results when tracing the dialectics between the different instrumental forces in his music. I am suggesting, though, that a description of dramatic structure, gesture or potential narrative implications is fully compatible with the presence of elaborate abstract structures of harmony and voice leading, and that uncovering the presence of such structures is a necessary process in order to more fully understand his music.

This leads me to the second application of his metaphor: the *polyphony-of-space* also governs Davidovsky’s internal dynamics of pitch and voice leading. His compositional process is motivated by a cyclical conception of the pitch aggregate, and from this point of view the light waves are a metaphor for the multiplicity of pitch collections (cycles and other symmetrical collections) at work within the piece. It is this application of the metaphor that I will be primarily discussing in this dissertation, and it is introduced below.

§ 1.1 The *Polyphony-Of-Space* Metaphor: Davidovsky’s Organicism

When applying the *polyphony-of-space* metaphor to the pitch and voice leading technicalities of Davidovsky’s music, we are inevitably discussing his musical organicism. Two
qualities are central to the organic metaphor of music: that of growth (with a purpose and a goal) and that of unity (organization of various parts into wholes). Unity is an essential concept for Davidovsky. Among other aspects, and as we will see throughout this dissertation, the internal coherence of his pitch method is a strong manifestation of this interest.

I want to take a moment and ruminate on the concepts of system, process and method. Method, which is usually defined as orderliness of thought, informs how something is made. Any compositional method will involve a multitude of elements, and for the purposes of this dissertation I will be referring to those pertaining to pitch (the aggregate, interval cycles, and symmetrical collections) and how they inform Davidovsky’s musical continuity and formal design.

His pitch method seems to lend itself to systematization in much the same way the serial techniques of the post-modern generation do. Yet Davidovsky’s pitch method is not systematic in the same way: there is no series, trichordal array, or systematic pitch multiplication. I believe this is what the composer means when he states that he is not a serial composer, which is why I won’t be using the term system when referring to the internal coherence of his pitch method.

Instead, we will talk about the coherent and consistent process of his pitch method—a process based on complex pitch structures at the service of his musical continuity and formal structures. The distinction between system and process was an essential philosophical and semantic issue for the members of the New York School, influenced by Varèse’s liberation of sound, and championed by composers such as Cage and Feldman. There is a relevant quote by Feldman on this matter:

I left the gathering quite late with Pierre Boulez, and we walked over to Cedar Tavern [meeting place for the New York School artists]. We closed the bar that night. Closed it,
in fact, for good—the building was being demolished. (…) Somehow it didn’t seem right that I should spend the last evening with Boulez, who is everything I don’t want art to be. It is Boulez, more than any composer today who has given system a new prestige—Boulez, who once said in an essay that he is not interested in how a piece sounds, only how it is made. No painter would talk that way.¹

The lack of a strict systematic organization in Davidovsky’s pitch method is probably the reason why analysts haven’t attempted to investigate the internal dynamics of his pitch structures. Yet there is process: a pitch method (with internal coherence, governed by the aggregate, interval cycles and symmetrical collections) is at the service of his sound, and informs his musical continuity and formal design. I will provide multiple examples of this process throughout this dissertation.

If unity refers to the internal coherence of Davidovsky’s pitch method, growth is the quality that generates its forms as it translates into the musical continuity. I will be employing a very particular musical application of the concept of growth, and in order to fully understand its ramifications, I will take a detour through Aristotle, who was the first to theorize the type of growth we are discussing: continuity (motion, change) not based on the concept of resolution (be it tonal or thematic), but on the concepts of potentiality and actuality.

In Aristotelian metaphysics the term entelechias is reserved for the state of a thing when it fully develops its telos—the ultimate goal or achievement in a development. It refers, thus, to the telos of a thing when it becomes actuality. In this view, completeness is the act of something having realized its telos. To provide an organic metaphor: the seed that has become a tree. Aristotle’s telos was highly influential in the first Western music theory treatises. It provided a

¹ Feldman 1985.
conceptual model for the need of dissonant intervals to resolve into consonant intervals.\(^2\) In these treatises the term *complete* was replaced by *perfect* when discussing the concept of tonal resolution.\(^3\) Aristotle did not imply that actuality was perfect, or that the seed *needed* to resolve into tree, only that it could, and I will not be making these kinds of implications here. I do not believe *resolution* is the force that drives Davidovsky’s compositional process, but I do believe *potentiality for completeness* is. An incomplete interval cycle will seek its completion, realizing, thus, its actuality: that of being a complete interval cycle. In Davidovsky’s *polyphony-of-space* metaphor, *entelechia* would correspond to how light travels in space: it propagates by self-perpetuating itself. Physics is still trying to explain this quality of the light wave–particles, but in Aristotle’s metaphysical world, there is an answer: light has telos.

I will be talking about two particular types of potentiality–actuality processes when applying the *entelechia* metaphor to Davidovsky’s compositional process: *symmetry potentiality–actuality*, and *interval cycle potentiality–actuality*. The *interval cycle potentiality–actuality* process refers to the various interval cycles that self-perpetuate, completing aggregates and moving the music forward. This self-perpetuation means that incomplete cycles will consistently be understood as longing for the pitch that will fulfill the cycle’s potentiality. The *symmetrical potentiality–actuality* process refers to asymmetrical collections that will consistently long for the pitch that will fulfill their symmetrical potentiality, also completing aggregates in the process.

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\(^2\) For a detailed study on this matter, see Cohen 2001.

\(^3\) Rameau’s *Traité de L’harmonie* (1722) was the first to study the variation of intervallic quality in harmonic progressions. As Cohen summarizes, many earlier contrapuntal treatises starting with John of Garland’s *De mensurabili musica* (mid-13\(^{th}\) century) place the terms “perfect” and “imperfect” in the context of very specific language that implies the desire, seeking and requirement of imperfect intervals to move toward perfect ones.
Both of these processes will be explored thoroughly in the context of Davidovsky’s Quartetts in Chapter Two (symmetrical processes) and Chapter Three (interval cycle processes). Chapter Two will also include a study of particular asymmetrical collections with interesting degrees of near-symmetry. The degree of near-symmetry measures the effort required of an asymmetrical collection to become symmetrical by moving one of its voices within its own cardinality $n$ (e.g., an asymmetrical tetrachord becoming a symmetrical tetrachord), or that of becoming symmetrical within the cardinality $n+1$ by introducing a particular pitch (e.g., an asymmetrical tetrachord becoming a symmetrical pentachord). The degree of near-symmetry, in essence, allows us to determine the strength of the collection’s potentiality for symmetry.

If *entelechia* refers to the actualities of the different self-perpetuating forces in Davidovsky’s compositional process, the term *enèrgeia* is reserved for the aggregate completion, which fuels and manipulates all things in the music. In Aristotle’s metaphysics, the term *enèrgeia* is the force, the dynamic process of something, and thus the start of activity: the seed being planted. In Davidovsky’s compositional method, the interval cycle and symmetrical potentiality–actuality processes are often a tool of this force (i.e., they are manipulated by it). Some pitches, once achieved through the potentiality–actuality processes, will trigger their own processes that will often remain incomplete as the aggregate completes itself. *Enèrgeia*, thus, has the power to change and mold the *entelechia* processes to suit its needs, in coherence with the notion that the seed has the potential to become tree, if the farmer allows it. Aristotle used both terms to explain the concept of *motion*. The main difference between them is that *entelechia* refers to an internal force (the force within the seed to become tree), while *enèrgeia* refers to an externalized force (the farmer planting the seed).\(^4\) The aggregate completion is, as with the

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\(^4\) For more on this matter, see Blair 1967, 1992, and 1993.
potentiality–actuality process, a drive toward the completion of something (in this case, the aggregate), yet it contains distinct potentiality–actuality processes within it and has the capability of molding their existence in the musical continuity.

The main reason to differentiate between the aggregate completion process and the potentiality–actuality processes, conceiving the former as subsuming the latter, is that while the aggregate completion always succeeds, the potentiality–actuality processes have a much more flexible success rate. This is because they are at the mercy of the larger external force of the musical continuity, the aggregate. Incomplete interval cycles can remain incomplete because their expected actuality (the last note, or series of notes) changes in order to fulfill the aggregate processes. These moments of expectation are in fact a major factor in Davidovsky’s compositional process: some expectations will be met, some will not, and together they shape the musical continuity and formal design.

*Entelechia* and *enèrgeia* govern Davidovsky’s compositional process with the capacity to inform both surface pitch structures and larger formal sections. This is the manifestation of unity as an essential quality to Davidovsky’s organicism that I have previously mentioned. Yet, unlike the tonal organicism of Schenker, Davidovsky’s organicism is not hierarchical. The way to understand this distinction is through his *polyphony-of-space* metaphor: light always travels at a
constant speed, it is how far from its source it is that governs the time it takes to reach us. The idea that certain self-perpetuating processes take longer than others to achieve actuality is a very interesting reinterpretation of the concept of unfolding. I will encourage a type of understanding of these processes that doesn’t involve the seemingly slower processes becoming deeper in the structural sense. They are not hierarchically deeper or more structurally important, they are simply traveling from different distances. The main consequence of this interpretation is that all potentialities in the musical continuity will be essential: they are all part of the polyphony-of-space.

There is another important consequence to Davidovsky’s organicism, what I’m calling his conception of sameness: multiple things becoming one, and/or multiple things that were one all along are finally revealed. An example of the first version of this conception (multiple things becoming one) is seen clearly in his Synchronisms No.6, for piano and tape. The piece starts with a single G5 in the piano with a fermata. As it naturally dies away (such is the nature of the piano itself), this same G5 is picked up by the tape part, which is also sustained. Yet the tape part has a crescendo that leads into the second measure, in which we hear the G5 repeated as a short attack, and the piano’s E4 response, also as a short attack. See Example 1–0 below.
Example 1–0. The G5 crescendo at the start of the piece between the piano and the tape (Synchronisms No.6, mm.1–2)

To the listeners the fascinating effect is that of a piano making a crescendo, an impossible dynamic transformation for the instrument. With this simple gesture the composer is able to combine two completely different instruments and timbres (with their own different physical and musical limitations) into a single entity. We can say that in m.1, the piano and the tape are the same, the G5 is the same. This very particular understanding of the piano and tape is not unique to his electroacoustic compositions—it is known that a major preoccupation behind his Synchronisms is precisely the fusion of the different instrumental forces into “super instruments”. In this case, a “super-piano” capable of crescendos.

Another important example of Davidovsky’s conception of sameness will be seen in Chapter Three, when I analyze the treatment of the starting and ending pitches of Quartetto (No.1). Instead of two different instrumental forces fusing into a single entity, the composer here manages to make two different pitch-classes (pc(0) and pc(1) behave as if they were one.
§ 1.2 A brief note on Davidovsky’s Quartettos

Davidovsky paused his work in the electronic music studio in 1974, with his *Synchronisms No. 8* for woodwind quintet and tape. For the next decade, he devoted himself to writing acoustic music for ensembles of various sizes. He wrote *Quartetto*\(^5\) in 1987, for flute and string trio. In this piece the composer returned to the idea of opposing instrumental forces that whisk, stir and mix, just like in his Synchronisms, only this time for a soloist and string trio. In essence, the string trio takes the role of the tape, and behaves like such throughout the entire Quartetto series. Such is the connection between the two series that Davidovsky returned to the Synchronisms promptly afterwards—he wrote his ninth Synchronism a year later (for violin and tape, 1988)—and at the same time continued to write three more Quartettos: No. 2 for oboe and string trio in 1996; No. 3 for piano and string trio in 2000; and No. 4 for clarinet and string trio in 2005. It would be an interesting project to compare these four acoustic pieces to those synchronisms dealing with the same soloists, though such a project is beyond the scope of this dissertation. I will focus only on his Quartettos, and uncover the pitch structures that sustain them.

§ 1.3 Davidovsky’s Potentiality–Actuality Processes

As noted above, the chief reason to invoke Aristotle when describing Davidovsky’s organicism is Aristotle’s own physics of motion—they offer us the possibility of describing musical continuity not from a perspective of harmonic resolution, but from the perspective of potentiality and actuality. This is a useful distinction, for it enables us to describe Davidovsky’s

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\(^5\) For clarity within this dissertation, Davidovsky’s first *Quartetto* will now be labeled as *Quartetto (No. 1)*. The actual title is simply *Quartetto*. 
musical continuity within its own compositional and aesthetic context. Example 1–1 below offers a demonstration of this difference. Example 1–1a shows a tonal progression in C major, which resolves the harmonic tension in the final cadence. The musical continuity in this gesture is dependent on the dichotomy of tonic and dominant, with its implied tension–release harmonic progression. On the other hand, Example 1–1b shows an example of musical continuity devised as a completed aggregate through the ic₅-cycle. Let’s focus on this second gesture.

Example 1–1. Two examples of musical continuity: a) tonal, based on a harmonic resolution; and b) atonal, based on a potentiality–actuality process

The first two measures involve the pitch-set [8,10,0,1,3,5]. At this point in time (end of the second measure) we can state that this pitch-set shows some of the characteristics of a future ic₅-cycle—it has the potentiality of becoming such a cycle. It is not yet a cycle, for it hasn’t reached its actuality, which would be to fulfill the entire motion toward the final G2 in measure
5. In this case, the pitch-set does fulfill its potentiality by completing the motion to G, and reaching, thus, its telos: the actuality of becoming an ic₅-cycle.

Imagine a scenario in which the final G₂ wasn’t achieved at the end of the gesture. The potentiality of the [8,10,0,1,3,5] pitch-set would still be intact, but the actuality of becoming the ic₅-cyle would be thwarted. Even more interesting: imagine now the same scenario in which the final G₂ would indeed arrive, yet several measures later, after a second musical gesture has started its own potentiality–actuality process. Figure 1–1 graphs a variation of this scenario. In between the potentiality of an almost-complete ic₅-cycle and its actuality, two separate potentiality processes are initiated.

![Diagram](image)

**Figure 1–1. Three interval cycles achieving the same actuality event, pc(7)**

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6 All pitch collections shown in the figures throughout the dissertation are presented in normal order, in brackets. Notice how in Figure 1–1 the ic₅-cycle resembles that of an ic₁-cycle—such is the nature of their construction. The concrete musical example being reduced in these figures will determine which cycle is being used in each instance.
What is interesting about this scenario is that the actualities of all three potentialities are fulfilled with the single arrival of the G: the ic₂-cycle and the ic₃-cycle are also “missing” G in order to fulfill their telos of becoming complete interval cycles. All three processes are equally important for the musical continuity, and each metaphorically represents a different wave in Davidovsky’s polyphony-of-space metaphor.

The same potentiality–actuality continuity can be traced in other types of pitch collections. Example 1–2 below imagines the pitch-set [9,11,3,4] as a simultaneity followed by a singleton, a gesture repeated three times.

Example 1–2. Pitch-set [9,11,3,4] seeking pc(5) for symmetrical actuality

The initial pitch-set is a member of the (0157) set-class, which as we will see in Chapter Two is a particularly interesting asymmetrical tetrachord. The collection is paired first with a D₅, creating the pitch-set [9,11,2,3,4], a member of the asymmetrical (01257) set-class. The second pairing with the G♭₅ creates a [3,4,6,9,11] pitch-set, a member of the also asymmetrical (01368) set-class. In the third and final pairing, it rests with an F₅, creating the [3,4,5,9,11] pitch-set, member of the now symmetrical (01268) set-class. I have fabricated this example to prove a point: our original asymmetrical [9,11,3,4] pitch-set has the potentiality of becoming a
symmetrical pentachord—in this case, the [3,4,5,9,11] pitch-set in m.3. The F5 in the second beat of m.3 is the actuality of that potentiality for symmetry. The D5 and G♭5 in mm.1–2 are failed attempts for such actuality, and represent the path of becoming for the final symmetrical pitch-set. If the F5 in m.3 never arrives, the potentiality for symmetry of the asymmetrical tetrachord is still intact, but the actuality of such symmetry would be thwarted.

I have shown two hypothetical examples of interval cycle and symmetrical actuality that can shape musical continuity. In Davidovsky’s music, as we will see, these two types of processes are a constant, and they embody the unified pitch method so important for his compositional method—they are all the seeds becoming trees. Let us now turn to why the seeds are planted in the first place.

§ 1.4 Davidovsky’s Aggregate

The external force behind the two potentiality–actuality processes described above is the completion of the aggregate. Recounting Aristotle’s physics of motion once more, the term enèrgeia refers to the idea of an active force, external to the telos of a thing, which facilitates the becoming of an actuality. In musical terms, the interval cycles and symmetrical collections will complete aggregates as they fuel the musical continuity.
Example 1–3. An aggregate process completed via an ic2-cycle, an ic6-cycle, and a symmetry potentiality–actuality process

Example 1–3 shows a third hypothetical example, a hybrid of the previous Examples 1–1b and 1–2. The pitch-set [8,10,0,2] in m.1 has the potentiality of becoming an ic2-cycle, which is happily actualized in m.2 with the arrival of the E4 and the G♭4 in the top staff. Interestingly enough, these two pitches are also part of a second potentiality process: our [3,4,9,11] pitch-set from Example 2 occurs in the first two beats of m.2, followed by the failed symmetry actuality attempt on the G♭4. The symmetrical actuality does occur, as Example 1–2, in the following measure with the pairing of this pitch-set with the high F5. Together, the ic2-cycle and the symmetrical [3,4,5,9,11] pitch-set trigger ten out of the twelve notes of the aggregate, which now emerges as an active force in the musical continuity. The remaining two pitches, D♭2 and G2, occur at the end of the gesture in the form of an ic6-cycle that, due to its brevity, is immediately actualized.

Moments like these occur constantly in Davidovsky’s music. Sometimes the symmetry potentiality–actuality processes will be enough to complete aggregates; sometimes the interval
cycle potentiality–actuality processes will be called in when necessary, as in the hypothetical Example 1-3 above. Sometimes these two processes will share pitches, as in the example, and often these shared pitches will be singled out on the surface of the music, be it by orchestration choices, dynamics, articulations, or range. I firmly believe Davidovsky’s *polyphony-of-space* is not meant to be a hidden structure in his music—the counterpoint is easily traceable once you are aware of what to look for.

§ 1.5 Representing the *Polyphony-Of-Space* Metaphor: Methodology

Our first objective is to depict the aggregate in a space capable of revealing symmetry and interval cycles. Figure 1–2 below is such a space: the ic5-cycle represented as pitch classes within the familiar MOD12 clock-face (each adjacent interval is ic5 rather than ic1).

![Diagram](image)

**Figure 1–2.** An aggregate process completed via an ic2-cycle, an ic6-cycle, and a symmetry potentiality–actuality process mapped within an ic5-MOD12 space
The figure above maps the hypothetical gesture from Example 1–3, which completes the aggregate through three distinct potentiality–actuality processes. The first is the ic₂-cycle starting on pc(8) and actualized with the arrival on pc(6). In the space, curved arrows connecting the circled pitch-class numbers represent this cycle. The arrows themselves represent the directedness of the voice leading. In this case, the initial [8,10,0,2] pitch-set is very salient in the surface of the music, thus the arrow is solid. The dashed arrow from pc(2) to pc(4) depicts the voice jump that occurs in m.2: the E₄ and G♭₄, which actualize the cycle, are heard in an inner voice, and up an octave. The second process is the symmetry potentiality inherent in the pitch-set [3,4,9,11]. The pitch-set is highlighted with solid boxes in the space: three ic₅-related pitches, and the lopsided pc(3). Two lines emanate from it: the dotted, bold line to pc(6) represents the initial failed symmetry actuality; and the irregularly dashed bold line to pc(5) shows the path toward symmetry as it is actualized in m.3. The third and last process is the ic₆-cycle between pc(1) and pc(7), which is depicted with a non-bold, dotted line through the circle space. All of the pitches are part of one or more processes, and thus, the aggregate is complete.

The ic₅-cycle in MOD₁₂ space as shown here is particularly useful when discussing symmetrical collections. Two matters are of importance in this discussion, and need clarification. The first one is in regard to Perle’s inversional symmetry model put forth in his studies of Bartok.⁷ This model, which places structural importance on the particular axes of symmetry of the pitch collections used, would seem integral in Davidovsky’s primary use of symmetry, yet these axes often assume a secondary role in the musical surface. As an example, Figure 1-3 below maps the resulting symmetrical pentachord from the previous Example 1–2 (shown again for convenience).

⁷ Perle 1955. The term IS-Model was put forth by Cohn when comparing it to his own TC-Model (transpositional combination model) (see Cohn 1987).

Figure 1–3. The symmetrical [3,4,5,9,11] pitch-set, a (01268) set-class mapped onto the ic₅⁻MOD₁₂ space.

If our focus is on the pitch-set itself, the axis of symmetry around E (a single point in our pitch space) is not revealed as such on the musical surface of Example 1–2. In order for us to
consider the axis as a structural element we would need a musical realization such as the one in Example 1–4, a rewrite of the previous Example 1–2.

Example 1–4. A different surface realization of Example 1–2, in which the axis around E is salient on the musical surface

Davidovsky’s music is not obvious about the axes of his symmetrical collections, which makes me hesitant to give them structural weight. In this music, when symmetrical collections are completing immediate aggregates, the axes of symmetry typically shift constantly. The multiplicity of axes, operating simultaneously and successively, prevents us from assigning any particular importance within the musical continuity. Figure 1–4 shows a more common “Davidovskyan” gesture. Three symmetrical collections (all members of the (0127) set-class) complete the aggregate. The three axes (around the [10,4], [6,0] and [2,8] dyads) are working together toward that goal.
Figure 1–4. Three symmetrical tetrachords (all members of the (0127) set-class) complete the aggregate

What is interesting about this example (which is not hypothetical, it occurs in Davidovsky’s *Quartetto No.4*, and will be discussed in Chapter Two) is the potentiality for the aggregate completion inherent in any combination of two out of the three tetrachords. In the particular example above, as we will see, the [11,0,1,6] and [7,8,9,2] pitch-sets occur in immediate succession on the surface of the music. The aggregate potentiality is actualized not by a particular pitch (as it was in the symmetrical and interval cycle potentiality–actuality processes discussed previously), but by a symmetrical collection. The [3,4,5,10] tetrachord actualizes the aggregate; it is singled out in the figure with bold dashed lines.

If pitch axes don’t seem especially pertinent to Davidovsky’s music, neither does the more abstract entity of the SUM. That is, even if our focus were on the pitch-class set in Figure 1–3 above, a (01268) set-class, SUM = 8 would not provide us with any relevant information.
about the musical passage itself. This issue lies at the heart of Cohn’s criticism of Perle’s inversional-symmetry model.  

The second matter that needs clarification in this discussion is actually quite relevant to understanding Davidovsky’s musical continuity: unlike the axes, it is the telos in the potentiality–actuality processes which can be assigned a structural weight in the musical continuity. Figure 1–5 below rewrites Figure 1–3 and focuses on a hypothetical potentiality–actuality process involving the same pitch-set.

![Diagram](attachment:image.png)

**Figure 1–5. The asymmetrical [3,4,9,11] pitch-set and its symmetrical potentiality into the [3,4,5,9,11] pitch-set**

Pc(5) actualizes the potentiality for symmetry of the [3,4,9,11] collection. In the ic5-MOD12 space this actuality is singled out, just as it was in Figure 1–4, with bold dashed lines. As we will see, these actualities are almost always singled out on Davidovsky’s musical surface,

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8 Cohn 1988.
providing them the aural weight that the axes of the symmetrical collections often lack (although, to be fair, not always).

We can expand the $ic_5$-cycle in MOD12 space. Figure 1–6 shows the $ic_1$-cycle embedded within the $ic_5$-cycle. These two cycles have a special relationship: all that’s needed to transform one into another is multiply each of their elements by 5 (e.g., $5 \times 5 = 25$, in MOD12 = 1). This type of multiplication-transformation ($M_5$) creates several useful compositional possibilities in our space. First, once embedded, both cycles preserve the position of the $ic_3$-cycle, and thus allow it to maintain a pivotal quality between them. Second, they both share the possibility of mapping the $ic_2$-cycles (the even, and the odd) by skipping every other pitch-class within the space. The $ic_2$-cycle is descending (i.e., clockwise) through the $ic_5$-cycle, while it is ascending (i.e., counterclockwise) through the $ic_1$-cycle. This mapping is, of course, also true for the $ic_4$-cycle (skipping every three pitch-classes within the space) and the $ic_6$-cycle. In other words, both the $ic_5$- and $ic_1$-cycles share their ability to not just map their own cycles (e.g., the aggregate), but all the other cycles as well.
Lastly, with this expanded space we are able to depict M$_5$ transformations such as the one shown in Figure 1–7 below.
Figure 1–7. An incomplete ic₅-cycle and its M₅ transformation into the chromatic pentachord

The figure above imagines an ic₅-cycle potentiality process in the form of the pitch-set [8,10,0,3,5] moving through the compositional space. It also imagines a chromatic pentachord as a second process in the music (perhaps a verticality, in order to mimic an actual example in Davidovsky’s Quartetto (No.1)), achieved through a M₅ transformation of the ic₅-cycle gesture. The bond between both processes is twofold: they both constitute interval cycle potentialities, and they are connected through the M₅ transformation.

The M₅ space opens the door to other modifications involving two cycles in close relationship. Figure 1–8 shows two ic₅-cycles a half step apart.
Figure 1–8. Two embedded ic5-cycles a half step apart

The circles in the figure group the (0156) pitch-class sets within the space (only two groupings are shown). In particular passages where multiple ic5-cycle potentiality–actuality processes are present, spaces like this one will be able to trace their paths. There are multiple variations of this space: Figure 1–9 below shows two ic5-cycles now a whole step apart.
There is another space equally suited to map music with constant intervallic tendencies: a *Tonnetz*. Figures 1–8 and 1–9 above, in fact, are circular representations of the (0156) and (0257) *Tonnetzen*, respectively. Figure 1–10 below shows such variation of the Neo-Riemannian generalized *Tonnetz* adapted to represent a pitch-class (0156) space.
Figure 1–10. Variation of the Neo-Riemannian generalized Tonnetz adapted to represent a (0156) set-class space

Every square in the space (with four circled pitch-classes as its corners) creates a (0156) set-class. The circle of fifths moves up–down through the space; the chromatic scale moves left–right; and two collateral interval cycles emerge: the ic₆-cycle, the diagonal from bottom left to top right; and the ic₄-cycle, from bottom right to top left. Let us map our previous Example 1–3 (shown again below) onto this space.
Example 1–3. An aggregate process completed via an ic2-cycle, an ic6-cycle, and a symmetry potentiality–actuality process

The above Figure 1–11 seems less successful in mapping the particular musical gesture than the previous ic5-MOD12 space—see Figure 1–12.
Unlike the MOD12 space, the openness of the Tonnetz’s boundaries isn’t well suited to visually map the aggregate. The final tritone, for example, could have been mapped on the bottom-right corner rather than on the top-left (which I’ve chosen simply for spacing issues). A second issue is the overall inefficiency of the collateral intervals of the two-axis Tonnetz in clarifying the gesture within the space. This shouldn’t discourage us, though, for Tonnetzes are flexible: we can shape and mold them to our needs by carefully orchestrating the intervals depicted, just as we are able to expand the clock space by embedding multiple circles. Let us consider expanding this Tonnetz to include a more efficient set of intervals. Figure 1–13 below is such a space, and it maps our gesture much more successfully.
Figure 1–13. Variation of the Neo-Riemannian generalized Tonnetz adapted to represent a (01356) set-class space, and Example 1–3 mapped onto it

Every square (with four pitch-classes as its corners) now has a pitch-class at its center, creating (01356) pentachords. The ic\textsubscript{2}- and ic\textsubscript{1}-cycles are still recurring up–down and left–right respectively, yet by tracing the collateral ic\textsubscript{6}- and ic\textsubscript{4}-cycles as diagonals we are able to uncover the ic\textsubscript{3}- and ic\textsubscript{2}-cycles respectively, which are needed to map the gesture smoothly within the space. Notice the ic\textsubscript{3}-cycle moving bottom-left to top-right, and the ic\textsubscript{2}-cycle moving from bottom-right to top-left. The ic\textsubscript{2}-cycle in the example is easily traced in the space up this diagonal. The symmetrical pitch-set, shown with double lines in Figure 1–13, is equally salient in this space. If the axis were a relevant feature in the musical surface it could be easily mapped: it is pc(4) at center of the symmetrical cross created by the double-line circled pitch-classes.
The boundaries of the space are still infinite, yet the aggregates are nicely contained in this version of the *Tonnetz*. See Figure 3–14.

Figure 1–14. The aggregates contained within each parallelogram of the (01356) *Tonnetz*

I will be using both the circular ic₅-MOD₁₂ space (with its variations) and the (01356) *Tonnetz* throughout this dissertation in order to map Davidovsky’s musical continuities. The discussion, in fact, will vary from one perspective to the other, depending on the particular potentiality–actuality process at hand.


CHAPTER TWO

*Symmetrical Potentiality—Actuality Processes in Quartettos No.2 and No.4* ⁹

§ 2.1 *Quartetto No.4*

The first aggregate of *Quartetto No.4* is achieved by two symmetrical potentiality–actuality processes: an initial asymmetrical \([11,1,5,6]\) pitch-set, longing for \(pc(7)\) (mm.1–4); and a second asymmetrical \([3,4,8,10]\) pitch-set longing for \(pc(2)\) (mm.5–6). See Examples 2–1 and 2–2 below.

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Example 2–1. 1\(^{st}\) SymP–A \((n+1)\) process: an asymmetrical \([11,1,5,6]\) pitch-set, \((0157)\) set-class, seeking \(pc(7)\) for symmetrical actuality, a \((01268)\) symmetrical pentachord

*(Quartetto No.4, mm.1–4)*

⁹ From now on, spelled as: SymP–A process.
Example 2–2. 2nd SymP–A (n+1) process: an asymmetrical [3,4,8,10] pitch-set, (0157) set-class, seeking pc(2) for symmetrical actuality, a (01268) symmetrical pentachord

(Quartetto No.4, mm.5–8)

The first process (Example 2–1) achieves actuality in the third beat of m.4, with the arrival of the solo G3 harmonic in the cello, after eleven vertical attacks of the [11,1,5,6] pitch-set. This type of SymP–A process, to which I will be adding the tag (n+x) to its label, creates a symmetrical collection of a higher cardinality by adding pitches to an initial asymmetrical collection of a lower cardinality.\footnote{The n denotes the cardinality of the original asymmetrical collection; the x denotes the number of pitches to be added to the original collection in order to make it symmetrical. An asymmetrical tetrachord, like the one in the example, has a cardinality of 4, to which we are adding one pitch (x=1) in order to create a symmetrical pentachord. I will only be discussing SymP–A processes (n+1) throughout this dissertation (i.e., only asymmetrical collections to which we are adding one pitch to make symmetrical), although theoretically (and practically, I presume), x can be any other number.} In this instance, we are adding the single pc(7) to the initial
[11,1,5,6] tetrachord—thus we are talking about a SymP–A \((n+1)\) process. Here, the result is the symmetrical pitch-set \([5,6,7,11,1]\), member of the \((01268)\) set-class. Figure 2–1 maps this first SymP–A \((n+1)\) process within our ic\(_5\)-MOD\(_{12}\) space.

\[\text{Figure 2–1: 1}^{\text{st}} \text{SymP–A \((n+1)\) process: an asymmetrical [11,1,5,6] pitch-set, (0157) set-class, seeking pc(7) for symmetrical actuality, a (01268) symmetrical pentachord}
\]

\((\text{Quartetto No.4, mm.1–4})\)

The second SymP–A \((n+1)\) process (Example 2–2) follows the same internal dynamic, though slightly varied: it has the [3,4,8,10] pitch-set in search for its symmetrical \textit{telos}, pc(2), through a path of failed actualities (see the viola moving from the accented C\(_4\) to accented D\(_\flat\)\(_4\), rising chromatically in mm.5–6). Figure 2–2 maps this gesture, which includes the expected pc(2) needed to actualize the potential symmetry of the also (0157) set-class into the (01268) set-class.
Figure 2–2. The 2nd SymP–A \((n+1)\) process: an asymmetrical \([3,4,8,10]\) pitch-set, \((0157)\) set-class, seeking \(pc(2)\) for symmetrical actuality, a \((01268)\) symmetrical pentachord

\((\text{Quartetto No.4, mm.5–8})\)

\(pc(2)\) arrives in m.8, and as with the first process, also in the cello—a sustained D5 with a *tenuto* marking. We will further discuss this moment of arrival shortly.

The two pitches that actualize both SymP–A \((n+1)\) processes, \(pc(7)\) and \(pc(2)\), are not coincidently an ic\(_5\)-dyad. \(pc(7)\) in fact lingers throughout the entire second process (m.5–6) in the cello in order to help prepare the arrival of \(pc(2)\) in m.8, and acting as its upper ic\(_5\)-companion.\(^{11}\) Figure 2–3 maps the combination of both processes within the ic\(_5\)-MOD\(_{12}\) space.

\(^{11}\) Every pitch-class within the ic\(_5\)-MOD\(_{12}\) space (and *Tonnetz*, for that matter) has a “lower” and “upper” ic\(_5\)-companion. These two adjectives refer to the spatial position of the pitches within the figures. Davidovsky often frames important pitches (e.g., *telos* of potentialities) with both of their ic\(_5\)-companions, just like in this example.
Figure 2–3. 1st and 2nd SymP–A \((n+1)\) processes combined within the aggregate.

Their symmetrical telos, the \([2,7]\) ic5-dyad, cues the axis of symmetry of the entire gesture

\textit{(Quartetto No.4, mm.1–8)}

Both SymP–A \((n+1)\) processes are rooted in the asymmetrical (0157) set-class. As we will see, this is a special set-class when it comes to its asymmetry. For now, it is important to understand that this tetrachord can only become a symmetrical pentachord when adding one particular pitch. Both of these processes were longing for their own specific \textit{telos}. That is: \textit{pc}(7) and \textit{pc}(2) had to be those pitches precisely. Since both processes deal with the same set-classes, we can relate them: the second process can be understood as a T\(_9\)I transformation of the first, with axis around the ic5-dyad \([2,7]\).

I mentioned in Chapter One that the IS–Model (assigning symmetrical axes a structural weight in the musical continuity) would not be a successful endeavor in this music. Instead I proposed to give the \textit{telos} of the SymP–A processes the structural weight, since these are the
pitches that emerge clearly on Davidovsky’s musical surfaces. Here we encounter a large-scale axis of symmetry, not the axis of the \((n+1)\) symmetrical collections (the resulting actualities), but the axis of symmetry of the combined SymP–A \((n+1)\) processes. Both \(pc(7)\) and \(pc(2)\) represent the actualities of the processes just discussed, and they also cue the axis of symmetry of the transformation relating them. That Davidovsky is able to realize such level of pitch abstraction onto the surface of the music is telling, and suggests a high interest in a precise musical clarity inherent in his aesthetic. We will return to this idea of clarity in the brief conclusion that ends this chapter.

A careful observer of Figure 2–3 above would realize that only \(pc(9)\) is missing for the aggregate to be completed. Davidovsky inserts it as a cello’s left hand *pizzicato* on the last eighth-note of m.6. It is then transferred to and sustained by the viola through an otherwise empty m.7. This A3 is carefully preparing the expected \(pc(2)\), the *telos* of the second SymP–A \((n+1)\) process that had been previously delayed by two failed actualities. This suspended preparation, a whole measure of \(pc(9)\) in the viola (m.7, see Example 2–2), is a wonderful instance of the highly controlled musical continuity of this music. It is also not coincidental that this A3 is the lower \(ic_5\)-companion of the expected \(pc(2)\), which finally arrives on the second beat of the following measure. Figure 2–4 maps the completed aggregate within the \(ic_5\)-MOD\(_{12}\) space.
Figure 2–4: \( \text{Pc}(9) \) is added to the actualized 1\(^{st}\) and 2\(^{nd}\) SymP–A \((n+1)\) processes, completing the aggregate (\textit{Quartetto No.4}, mm.1–9)

These first eight measures constitute the start of the string trio introduction of \textit{Quartetto No.4}. In m.13, the clarinet will enter for the first time with a nine-measure solo. We will discuss this moment shortly, for now let us finish the introduction, as a second localized aggregate occurs before the clarinet’s entry. Example 2-3 shows the following mm.8-12.
Example 2–3. The 3rd and 4th SymP–A \((n+1)\) processes: an asymmetrical \([7,9,1,2]\) pitch-set seeking \(\text{pc}(3)\) for symmetrical actuality; and an asymmetrical \([5,7,11,0]\) pitch-set seeking \(\text{pc}(1)\) for symmetrical actuality, both \(0157\) set-classes to become \(01268\) symmetrical pentachords (Quartetto No.4, mm.8–12)

The ic5-dyad that actualized the second SymP–A \((n+1)\) process, \([9,2]\), is actually heard accompanied by a C♯4–G4 double-stop in the violin, creating yet another \(0157\) set-class, pitch-set \([7,9,1,2]\). This is the third SymP–A \((n+1)\) process of the piece. Its telos is \(\text{pc}(3)\), which won’t structurally arrive until m.14 as part of the clarinet’s solo line (not shown in the example).

Instead of the expected \(\text{pc}(3)\), the cello’s sustained D5 moves down to C5 and into m.9, while the violin and viola prolong the double-stop pitches, A3 and C♯4, via a voice exchange (A3 is transferred up an octave to A4). This failed symmetrical actuality (the arrival of \(\text{pc}(2)\) instead of \(\text{pc}(3)\) as part of the descending major second gesture D5–C5) is imitated in the violin and transposed at \(T_8\) to B♭5–A♭5 a measure later (notice the same dynamic and articulation markings
In another highly controlled decision by the composer, these two pitches, pc(10) and pc(8), are the upper and lower ic5-companions of the expected pc(3) that would have actualized the third SymP–A \((n+1)\) process. See Figure 2–5 below.

**Figure 2–5:** The 3\(^{rd}\) SymP–A \((n+1)\) process seeking pc(3); the cello’s failed actuality gesture pc(2)–pc(0) is transposed to the violin at \(T_8\) to introduce the upper and lower ic5-companions of the expected pc(3), pc(10) and pc(8) (*Quartetto No.4*, mm.8–9)

This failed actuality gesture, with its introduction of pc(0), will enable the fourth (and last) SymP–A \((n+1)\) process before the clarinet entry: a \([11,0,5,7]\) pitch-set (yet another \((0157)\) set-class) between the cello and viola in mm.9–10, seeking pc(1) in order to balance its symmetry into—another—\((01268)\) set-class. This fourth process can be considered immediately actualized due to the presence of the C\#4 in the viola in m.9, the product of the previous voice exchange prolonging the A3 and C\#4 of the third SymP–A \((n+1)\) process. We could make the
case for the C♯3 at the end of the viola run in m.11 to be the real telos of the process, as it is marked \textit{più forte} and with an accent articulation. Either way, pc(1), needed to balance the fourth SymP-A process into the symmetrical (01268) pentachord, belongs to both the third and fourth processes—this will be discussed shortly. Figure 2–6 maps the fourth SymP–A \((n+1)\) process within the \textit{ic}_5\text{-MOD}_{12} \text{space.}

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{figure2-6.png}
\caption{The 4\textsuperscript{th} SymP–A \((n+1)\) process, an asymmetrical \([5,7,11,0]\) pitch-set seeking pc(1) for symmetrical actuality, is immediately actualized into the \([11,0,1,5,7]\) pitch-set, another symmetrical \((01268)\) pentachord}
\end{figure}

As with the first and second SymP–A \((n+1)\) processes, the third and fourth also deal with the asymmetrical \((0157)\) tetrachord becoming a symmetrical \((01268)\) pentachord. Yet as the piece progresses, the actualities of these processes become more obscured. The first process had a very clear actuality event in the solo cello’s pc(7) in m.4 (see Example 2-1); the second process
searched for pc(2), which once achieved in m.8 (also in the cello, see Example 2-2) was obscured by the ic\textsubscript{6}-dyad [1,7] in the violin, marking the start of the third process (see Example 2-3); this third process, in search for pc(3), is not immediately actualized and will take several measures to do so. It would seem that Davidovsky is methodically stretching the potentiality–actuality events, making them overlap and interact just as we would imagine them in a complex, polyphonic piece. This overlapping is particularly interesting in the second half of the string trio’s introduction before the clarinet entry.

Figure 2–7 combines the third and fourth SymP–A \((n+1)\) processes (mm.8-12). Just like the first two processes (mm.1–8), they are inversionally related, in this instance, at T\textsubscript{2}I.
Figure 2–7. The 3rd and 4th SymP–A \((n+1)\) processes combined within the aggregate. The axis of symmetry is found around the doubled \(pc(7)\) and \(pc(1)\). The \([4,6]\) dyad is missing to complete the aggregate (Quartetto No.4, mm.8–10)

Notice how the \(T_2I\) transformation of the \([1,2,3,7,9]\) pitch-set into the \([11,0,1,5,7]\) pitch-set retains two common tones, \(pc(7)\) and \(pc(1)\). This doubling is also realized on the surface of the music: \(pc(7)\) moves from the violin’s double-stop in mm.8–9 to the cello’s double-stop in mm.8–11, yet it remains in the same range \(G4\) preserving pitch and only changing its timbre;\(^{12}\) and \(pc(1)\), as mentioned, is prolonged through the voice exchange between the violin and viola in mm.8–9, and it also ends the viola run in m.11. These two pitches, an \(ic_6\)-dyad \([1,7]\), cue the axis

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\(^{12}\) This is a very common gesture in Davidovsky, which I relate to his conception of *sameness* already mentioned: a pitch retains its frequency, yet changes its timbre as it is prolonged on the musical surface. Here, the \(pc(7)\) being prolonged via this timbre exchange is part of two different symmetrical processes, the third and the fourth.
of symmetry of the related processes, just like the ic5-dyad [2,7] cued the resulting axis of the transformation between the first and second SymP–A \((n+1)\) processes.

Because the third and fourth processes retain two common tones within the aggregate process, Davidovsky is now missing two pitches in order to complete it, unlike the first eight measures where the first and second processes accounted for eleven out of the twelve pitches. That is, and as seen in the figure above, the T2I transformation of the \([1,2,3,7,9]\) pitch-set (third process) into the \([11,0,1,5,7]\) pitch-set (fourth process) accounts for ten out of the twelve notes of the aggregate, which is now searching for the ic2-dyad \([4,6]\) in order to be actualized. It would seem, thus, that not only is Davidovsky stretching the potentiality–actuality events, but he is also complicating the localized aggregates they create: the more common tones they share, the more processes will be needed in order to complete the aggregate. In this moment, Davidovsky introduces an underlying interval cycle potentiality–actuality process\(^{13}\) in charge of achieving the aggregate. In fact, the expected ic2-dyad \([4,6]\) also actualizes this embedded ic2-cycle that is working in the background throughout these measures. See Example 2–4 below, which shows the previous Example 2-3, now with our attention focused on the underlying ic2-cycle.

\(^{13}\) From now on, spelled as: ic\(_x\)P–A process, where \(x\) is the interval-class creating the cycle. I will devote Chapter Three to ic\(_x\)P–A processes, and any mention of them in this chapter will be in support of SymP–A processes.
Example 2–4. An Embedded ic₂-cycle at work along side with the 3rd and 4th SymP–A \((n+1)\) processes: D–C in the cello, B♭–A♭ in the violin, and E–F♯ in the viola

\textit{(Quartetto No.4, mm.8–12)}

The start of the cycle is the failed symmetry actuality event in m.8, the already discussed D5–C5 gesture in the cello. This gesture was the starting point of the third SymP–A \((n+1)\) process, and it is also the start of the underlying ic₂P–A process as well; the cycle is continued with the recall of the descending major second gesture in the violin, transposed to pc(10) and pc(8) in mm.9–10. Note, these were the two ic₅-companions of the expected pc(3) that would have actualized the third SymP–A \((n+1)\) process. The ic₂P–A process is actualized in the viola on the downbeat of m.12 with the arrival of the missing ic₂-dyad [4,6]. This dyad actualizes both the aggregate, and the underlying ic₂-cycle. Notice how it is treated on the surface of the music:
written as a double-stop, sustaining while the rest of the ensemble is silent. Also significant is that all three string instruments participate in the unfolding of this cycle. See Figure 2–8.

**Figure 2–8. The embedded ic₂P–A process underlying the 3rd and 4th SymP–A (n+1) processes: an even ic₂-cycle segmented in three ic₂-dyads (Quartetto No.4, mm.8–12)**

Figure 2–9 below now maps the third and fourth SymP–A (n+1) processes along with the embedded ic₂-cycle within the (01356) Tonnetz.
Figure 2–9. The 3rd and 4th SymP–A (n+1) processes (with the expected pc(3) actuality) and the underlying ic₂-cycle (*Quartetto* No.4, mm.8–12)

The ic₂-cycle is traced along the ic₂-diagonal (bottom-right to top-left), and the resulting symmetrical (01268) set-classes are the two crosses in the space. Pc(3), *telos* of the third process is in a bold-dashed line as it hasn’t occurred in the musical surface yet. The failed actuality of this third process, carried by the cello’s D–C gesture in m.8 (the start of the underlying ic₂-cycle as well) also cues the symmetrical axis transformation by a whole step of the [1,2,3,7,9] pitch-set (actualized third SymP-A (n+1) process) into the [11,0,1,5,7] pitch-set (actualized fourth SymP-A (n+1) process).

Within this *Tonnetz* it is easy to extract the common tones of the T₂I transformation that relate these processes—these common tones will always be positioned at the corners of the
parallelogram created as the (01268) set-classes move up or down through the $ic_2$-cycle diagonal, as seen in Figure 2–10 below.

![Figure 2–10: Common Tones of the $T_2I$ transformation of the (01268) set-class, which relates the 3rd and 4th SymP–A $(n+1)$ processes (Quartetto No.4, mm.8–12)](image)

As mentioned earlier, the transformation of the first SymP–A $(n+1)$ process into the second in mm.1–8 did not retain any common tones. Figure 2–11 maps them within the Tonnetz.
Figure 2–11: The T₉₁ transformation of the (01268) set-class, which relates the 1ˢᵗ and 2ⁿᵈ SymP–A (n+1) processes (Quartetto No.4, mm.1–8)

To clarify: the T₉₁ transformation of the (01268) set-class, along the ic₃-diagonal, does not produce any common tones, while the T₂₁ transformation along the ic₂-diagonal retains two (remember that this had consequences on the musical surface of the piece). Let us compare all four processes in the same space. See Figure 2–12 below.
Figure 2–12: The 1st and 2nd SymP–A (n+1) processes (left hand side) and the 3rd and 4th SymP–A (n+1) processes (right hand side), along the ic₃ and ic₂ diagonals respectively (Quartetto No.4, mm.1–12)

For clarity, I’ve split the space in two and pc(2) in both spaces is the same pitch. The first two processes moved through the ic₃-cycle, the last two moved though the ic₂-cycle. Figure 2–13 combines them within the ic₃-MOD₁₂ space. All are, of course, members of the symmetrical (01268) set-class.
Figure 2–13: The four SymP–A \((n+1)\) processes, actualized, all members of the \((01268)\) set-class. The 3\textsuperscript{rd} SymP–A \((n+1)\) process creates an asymmetry within the large-scale aggregate (\textit{Quartetto No.4, mm.1–12}).

Notice the asymmetry of the processes themselves as they complete a large-scale aggregate. Remember, the first and second SymP-A \((n+1)\) processes were the main force in the localized aggregate actuality occurring in mm.1-8. The third and fourth almost completed a second localized aggregate in mm.9-12, as the third process was still seeking pc(3) for actuality. Combined, a large-scale aggregate emerges. The first, second and fourth processes are all aligned within the ic\textsubscript{3}-cycle, with axes around pc(0), pc(3) and pc(6)—the third process, though, seems to have gone rogue. It should have been an \([8,9,10,2,4]\) pitch-set, with its axis aligned around pc(9).
Instead, Davidovsky shifts it around pc(2), the pitch that actualized the second SymP-A \((n+1)\) process, and more importantly, completed the first aggregate of the piece.

Figure 2–14: The 1\textsuperscript{st}, 2\textsuperscript{nd} and 4\textsuperscript{th} SymP–A \((n+1)\) processes aligned within the ic\textsubscript{3}-cycle

\textit{(Quartetto No.4, mm.1–12)}

Figure 2–14 above disregards the third SymP–A \((n+1)\) process in order to trace the first, second and fourth processes along the ic\textsubscript{3}-cycle diagonal within the \textit{Tonnetz}. If we were to apply the potentiality–actuality process to these three processes themselves, we could say that they have the potentiality of completing the (01268) transformations through the ic\textsubscript{3}-cycle. The actuality of such large-scale process would thus be the pitch-set \([8,9,10,2,4]\)–instead, Davidovsky provides a third SymP-A \((n+1)\) a T\textsubscript{5} away, the \([1,2,3,7,9]\) pitch-set (with the missing pc(3), the unachieved \textit{telos}).
Figure 2–15: The expected [8,9,10,2,4] pitch-set, and the realized [1,2,3,7,9] of the 3rd SymP–A \((n+1)\) process, a \(T_5\) transformation (Quartetto No.4, mm.1–12)

I’ll provide two reasons for the “roguishness” of the third process. The first is in regard to the localized continuity and aggregate completions in the first and second halves of this introduction: the completion of a large-scale aggregate process was not a priority here. Instead, the dichotomy between the \(ic_3\)-cycle-based transformation of the first process into the second, and the \(ic_2\)-cycle-based transformation of the third into the fourth could be the main goal of the first twelve measures. The second reason is the creation of a (very) large-scale potentiality—actuality process: the goal of the piece could very well be to complete the (01268) \(ic_3\)-cycle-based transformations. Instead of longing for a particular pitch, the piece itself is longing for a particular realization of the (01268) set-class, the [8,9,10,2,4] pitch-set.

These twelve measures of Quartetto No.4 are the perfect introduction to the particular set-class quality of near-symmetry. Near-symmetry is rooted on two premises: first, the premise
that not all asymmetrical collections have the same level of asymmetry; and second, that some asymmetrical collections are more prone to symmetry than others. Davidovsky is exploring both of these with his use of the asymmetrical (0157) set-class, and its actuality into the (01268) symmetrical set-class. There are other special collections that enter into related symmetry-based processes, which will be explored.

§ 2.2 Near-Symmetry: A Brief Study Of The Symmetrical Telos 14

As just mentioned above, the concept of near-symmetry can be addressed from two perspectives. The first perspective is based on the notion that not all asymmetry is the same. We will call this near-symmetry n,15 for we are exploring symmetry and asymmetry between collections of the same cardinality. In N–Sn, the polarity between symmetry and asymmetry within a cardinality class becomes a continuum, with “super-symmetrical” collections on one extreme, “super-asymmetrical” collections on the other, and the rest somewhere in between.

Figure 2–16 below shows Straus’s parsimonious voice-leading space for trichord classes, with added clarification on particular set-class properties.16

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14 For the purpose of this dissertation I will move rather swiftly through the theoretical implications of near-symmetry. There is a larger endeavor at hand here, beyond the scope of analyzing Davidovsky’s music.

15 From now on, spelled as: N–Sn, where n is the cardinality number of the set-class discussed.

16 Straus 2005.
Figure 2–16. Straus’s parsimonious voice-leading space for trichord classes, with added clarification on set-class properties

The shaded set-classes represent those that are symmetrical. The bold circles represent cyclic sets, and those with a double line represent those sets that have Cohn’s transpositional combinatorial property (they can be constructed via the multiplication of a fixed interval). As Figure 2–16 shows, when it comes to trichords all three properties converge in the five symmetrical set-classes. Theoretically this means that it would be difficult to assess which of these properties (symmetrical, cyclic, or transpositional-combination) is the reason behind the collection’s presence within a particular musical passage. This issue lies at the heart of the inversion-symmetry model versus the transpositional-combination model proposed by Cohn in

17 Cohn 1987.
regards to Bartok’s compositional method\textsuperscript{18}. In Davidovsky’s music the issue is similarly relevant: set-class (012), for example, is a potential ic\textsubscript{1}P–A process (the ic\textsubscript{1}-cycle), as it is a contained symmetrical collection, and it is also the result of two half steps, a half step apart.\textsuperscript{19}

Both the cyclic and transpositional combination properties are obviously important in the study of Davidovsky’s music, as they are rooted in interval cycles and other recurring interval patterns. The composer will exploit their differences, however.

Figure 2–17 maps an abstract (0157) set-class within the ic\textsubscript{5}-MOD\textsubscript{12} space, the principal asymmetrical tetrachord in the first twelve measures of Quartetto No.4. Out of the collection’s multiple subdivisions, the one of interest to us is the following: three ic\textsubscript{5}-related pitches, and a lopsided pitch a half step away from the axis of symmetry.

\begin{figure} 
\centering
\includegraphics[width=\textwidth]{image}
\caption{The (0157) tetrachord mapped within the ic\textsubscript{5}-MOD\textsubscript{12} space}
\end{figure}

\textsuperscript{18} Cohn 1988.
\textsuperscript{19} This is the main difference between a cyclic set and one with the transpositional combination property: the cyclic set is generated by only one interval (all interval cycles are cyclic sets); a set with the TC-property can be cyclic (e.g., two minor seconds, a minor second apart) or not (e.g., two minor seconds a minor third apart).
This subdivision of the (0157) set-class (one of several) places emphasis on its almost cyclic property—the (027) subset as the core, the heart, of the collection. It is up to us to discover if it is also the main reason behind the collection’s use by Davidovsky. Our problem in doing so is that the four SymP–A \((n+1)\) processes discussed at the start of Quartetto No.4 don’t emphasize this subdivision, as the set mostly occurs as a verticality. Yet there is clarity when the clarinet enters in m.13.\(^20\) See Example 2–5 below.

![Example 2–5](image)

**Example 2–5. The clarinet solo line, a 5\(^{th}\) SymP–A \((n+1)\) process also starting with a (0157) set-class (Quartetto no.4, mm.13–20)**

The clarinet enters with the pitches \(A\flat 3–E\flat 5–B\flat 4\), and D\(^3\).\(^21\) The 3+1 subdivision of the resulting (0157) set-class, the three ic\(\times\)-related pitches and the lopsided pitch, is emphasized by the three-beat silence in m.18. The cyclic property of the (027) set-class is also emphasized by

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\(^{20}\) The clarinet is mostly a linear instrument; it makes sense for it to clarify the verticalities previously introduced by the string trio. This particular dichotomy between chords and solo melodic lines is an important feature of all four Quartettos, and can be related to Davidovsky’s conception of sameness.

\(^{21}\) These musical examples are in concert score. Example 2–5 is missing the treble clef marking at the start due to the particular placement of the clarinet’s entry within the score (which occurs in the middle of a system).
the entries of the ic₅-related pitches themselves, counterclockwise within the ic₅-MOD₁₂ space.

See Figure 2-18.

![Diagram of ic₅-related pitches](image)

**Figure 2–18. The clarinet enters with a [8,10,2,3] pitch-set, a (0157) set-class, with a surface realization of the ic₅-related pitches (in cyclic order) plus the lopsided pc(2) (Quartetto No.4, mm.13–18)**

If indeed Davidovsky’s understanding of the (0157) set-class is as a (027) set-class with an added singleton, we can return and reassess the SymP–A (n+1) processes at the start of the piece. See Figure 2–19.
Figure 2–19. Reassessment of the 1st and 2nd SymP–A \((n+1)\) processes at the start of the piece, with the \((0157)\) set-classes segmented as sc\((027)\) + 1 pitch. The symmetry–asymmetry–symmetry pattern emerges. \(\text{Quartetto No.4, mm.1–8}\)

The figure above shows the hypothetical ic\(_2\)-based subdivision of the \((0157)\) set-class applied to the first and second SymP–A \((n+1)\) processes of the piece. A large-scale continuity process emerges: the symmetrical trichord \((027)\) becomes asymmetrical by the addition of the lopsided singleton and becoming a \((0157)\) set-class, which is then corrected by adding the pitch that will balance the asymmetry into the symmetrical \((01268)\) pentachord.

It is thus obvious that the cyclic and transpositional combination properties are important for Davidovsky. The balance–imbalance of the symmetries, however, is a totally different type of continuity. Near-symmetry will help us understand how this continuity is fueled.

It is common to consider asymmetry as a fixed property—either a collection is symmetrical, or it is not. If it’s symmetrical, one can consider multiple things: the three
properties already presented above, plus the added notion of degrees of transpositional and inversional symmetry. If a collection is asymmetrical, one can consider its position in a parsimonious space like the one shown in Figure 2–16 (which places more chromatic sets on the top-left, and more intervalically spacious sets on the bottom-right), yet not much else has been done to distinguish the different types of asymmetry. I propose including the property of near-symmetry in this discussion, which will allow us to assess different levels of asymmetry in regards to a collection’s efforts to become symmetrical. In essence, we are measuring the set’s symmetrical telos.

As an example, let us consider the (013) set-class. It is easy to see in Figure 2–20 below that the set is one parsimonious move away from two symmetrical collections, the (012) and (024) set-classes.

![Figure 2–20. The asymmetrical (013) set-class and its placement within the parsimonious space from two symmetrical trichords, the (012) and (024) set-classes](image-url)
This means that by moving one of its members by a half step, we can arrive at either of the two symmetrical collections. Figure 2–21 shows this transformation within an ic1-MOD12 space.

![Diagram showing transformation between asymmetrical and symmetrical set-classes]

**Figure 2–21. The asymmetrical (013) set-class becoming the symmetrical (012) and/or (024) set-classes**

Since it is one parsimonious move away from two symmetrical collections of the same cardinality, we can say that the (013) set-class has a degree of near-symmetry $n$ of 2.\(^{22}\) Below is the complete list of asymmetrical trichords with their degree of N-S$_n$.

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\(^{22}\) From now on, near-symmetry $n$ will be spelled simply as N–S$_n$, as opposed to N–S$_{n+1}$—I will talk about the difference between the two shortly.
A few interesting observations can be made from this list. The uniqueness of (037) is highlighted here: it is the asymmetrical trichord with the most symmetrical telos. In fact, it is so close to becoming symmetrical that we can consider it the most symmetrical of the asymmetrical trichords. In the asymmetry continuum, it would be placed to the right of the symmetrical trichords. The (015), on the other hand, is the most asymmetrical of the trichords—it can be aligned with the maximum asymmetry point within the continuum. See Figure 2.22.

Figure 2–22. The asymmetry continuum of trichord set-classes, with their degrees of N–$S_n$.

The (037) and (015) set-classes stand alone at the poles.
Now, let us consider the (016) set-class. It has a degree of $N-S_n$ of 1, as it can only become a symmetrical (027) set-class. Figure 2-23 shows this transformation within an $ic_{12}$-MOD $12$ space.

![Figure 2-23. The asymmetrical (016) set-class becoming the symmetrical (027) set-class](image)

As with the (027) set-class, (016) is also a subset of (0157), so it is especially relevant for us. It can become a (0157) set-class by adding a pitch and it can become a (027) set-class by moving any of its members by a half step. I’ll jump ahead to mm.30–31 of *Quartetto No.4* in order to show how the composer exploits this relationship. See Example 2–6 below.
Example 2–6: The (016) and (027) set-classes becoming each other as they each retain a common perfect fifth (*Quartetto No.4*, mm.30–32)

At the heart of the passage lie two ic⁵-dyads: the [2,7] dyad in the strings, connected by a bow marking; and the [6,1] dyad in the clarinet, also salient due to its longer rhythmic and register shift. The strings’ ic⁵-dyad is first heard within the context of pc(9), held over from m.29 (not shown). Together, these three pitches combine into a (027) set-class, the pitch-set [7,9,2]. After the [2,7] dyad (played in unison by the violin and cello), pc(8) is heard in m.32 thus creating a (016) set-class. The symmetry of the gesture is beautifully constructed. The low pc(9) in m.30 moves to the high pc(8) in m.32, around the shared common tones [2,7].

The second ic⁵-dyad is in the clarinet. It is first heard within the context of the preceding pc(0), with whom it creates a [0,1,6] pitch-set, a (016) set-class. After the ic⁵-dyad [1,6] the clarinet awaits pc(8) (the string unison) creating the [6,8,1] pitch-set, a (027) set-class. The
clarinet’s gesture is in diminution, transposed and mirrored from the strings’ gesture. The strings move from a (027) to a (016) set-class retaining the ic₃-dyad; the clarinet moves from a (016) to a (027) set-class retaining the ic₅-dyad. See Figure 2–24 below.

Figure 2–24. The (016) and (027) set-classes becoming each other as they each retain a common perfect fifth (Quartetto No.4, mm.30–32)
It would be useful now to expand our abstract large-scale continuity process to what is shown in Figure 2–25 below.

![Diagram of symmetrical-asymmetrical pattern](image)

**Figure 2–25. The symmetrical–asymmetrical pattern in its two paths emanating from the smallest common denominator, the perfect fifth**

The seed is now a simple fifth, and it is what we add to it that determines the path of the large-scale continuity process. If the fifth becomes symmetrical in the form of the (027) set-class, the path is the one already explored. However, if the fifth becomes asymmetrical in the form of the (016) set-class, we are in new territory. I will return to this very shortly.

The N–S\textsubscript{n} property is similarly interesting when applied to the tetrachord set-classes. Figure 2–26 shows Straus’s parsimonious voice-leading space for tetrachords, with added clarification on set-class properties.\(^{23}\)

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\(^{23}\) Straus 2005. Note that the (0148) set-class is doubled in the space to avoid clutter.
Notice how the three properties that converged within trichords (symmetry, cyclic, TC–Property) do not do so here: only six of the fifteen symmetrical set-classes retain all three. Two rogues stand out: the (0127) and (0248) set-classes are the only symmetrical collections without the TC–property.

If we attempt to apply the N–Sn property to just the symmetrical tetrachords we run into the problem that none of them is within a half step of another (the same is true for the symmetrical trichords). A solution to this would be to expand the concept of N–Sn to include whole steps, in which case we are dealing with a “secondary” type of N–Sn, opposing the
“primary” type of N–Sₙ that involves parsimonious voice leading. Below is the N–Sₙ table for the symmetrical tetrachords, which includes both types, primary and secondary.

<table>
<thead>
<tr>
<th>S.C</th>
<th>Primary N–Sₙ</th>
<th>Secondary N–Sₙ</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cyclic:</td>
<td>0123</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>0246</td>
<td>0</td>
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<td>0369</td>
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<td></td>
<td>0167</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>0268</td>
<td>0</td>
</tr>
<tr>
<td>Non-Cyclic:</td>
<td>0127</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>0134</td>
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<tr>
<td></td>
<td>0145</td>
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<tr>
<td></td>
<td>0358</td>
<td>0</td>
</tr>
</tbody>
</table>

Table 2-2. N–Sₙ table for the primary and secondary symmetrical tetrachords

Of particular note are two collections: (0257) is a whole step away from becoming ten other symmetrical collections, only four of them remain out of its reach; and the already special (0127) set-class, which is, in this scale, the least symmetrical of the symmetrical tetrachords. This could explain its rogue properties. Notice, though, that the (0248) collection (the other symmetrical collection without the TC–property) is fairly high on the secondary N–Sₙ scale, with a secondary N–Sₙ degree of 8. It shares the same degree as its other incomplete whole-tone partner, the (0246) set-class. Figure 2–27 places them all within the symmetrical continuum.
Davidovsky seems aware of the special properties of the (0127) tetrachord. In fact, mm.30–32 explained above (in regard to the relationship between the asymmetrical (016) and symmetrical (027) set-classes) are part of a larger aggregate processes involving the (0127) set-class. See Example 2–7 below.

**Figure 2–27: The symmetry continuum of tetrachordal set-classes, with their primary (x) and secondary (y) degrees of N–S\(_n\) [x/y]**

Bold Line: Cyclic
Example 2–7. The (0127) set-class governing the (016)–(027) transformations (*Quartetto No. 4, mm.29–34*)

The pitch-set [7,8,9,2] in mm.29–32 in the strings, member of the (0127) set-class, enfolds the (027) into the (016) set-class transformation previously discussed in Example 2–7—now we are including the pc(9) and pc(8) that exchanged places around the fixed perfect fifth in the gesture’s segmentation. The clarinet mimics this gesture in mm.32–34, which also includes the exchange of the same pitches only in reverse, and around a different perfect fifth, the [10,3] ic₅-dyad. The resulting pitch-set [8,9,10,3] is also a (0127) set-class.

There is yet another (0127) set-class in the example. Above the string’s gesture in mm.29–32, the clarinet plays the [11,0,1,6] pitch-set. Combined, these two (0127) set-classes in mm.29–32 do not create any common tones, and fill eight notes of the aggregate. We could say that these two collections create a large SymP–A process in themselves. All they are missing is the pitch-set [3,4,5,10], a third (0127) set-class, to complete the aggregate. See Figure 2–28.
Figure 2–28. Pitch-set [7,8,9,2] in the strings and pitch-set [11,0,1,6] in clarinet combined in the aggregate process—the pitch-set [3,4,5,10] is expected (Quartetto No.4, mm.29–32)

The individual pitches of the expected [3,4,5,10] pitch-set are present, but their segmentation is obscured on the surface of the music. Pc(4) and pc(5) are in the violin at the end of the example, clearly linked by the bow and special string markings; the [3,10] is the ic5-dyad around which the clarinet exchanges pc(8) and pc(9) in mm.32–34. It would seem that Davidovsky is obscuring the actuality of the aggregate in these measures. Because the two pitch pairs ([4,5] and [3,10]) of the expected [3,4,5,10] pitch-set do not seem to be connected on the musical surface, I am reluctant to consider them part of the same collection. Also, notice the special string marking on the violin while playing the E5 and F5 in mm.33–34: the first E5 is heard on the A string (a normal fingering), only to be repeated as an open string, removing the
possibility for vibrato, and perhaps implying a dissolution of the structural weight of the note. Instead, I propose another reading of the passage, as seen in Figure 2–29.

Figure 2–29. Three (0127) set-classes combined. Davidovsky disregards the possible symmetrical segmentation of the aggregate in order to create two doubled pitches, pc(8) and pc(9), to be exposed on the surface of the music (Quartetto No.4, mm.29–34)

The [8,9,10,3] pitch-set heard in the clarinet at the end of the example creates an asymmetry in the aggregate process, similar to the asymmetry created by the four SymP–A \((n+1)\) processes that started the piece, from mm.1–12. Here, the rogue [8,9,10,3] pitch-set in the clarinet in mm.32–34 creates two common tones in our aggregate: pc(8) and pc(9). As already discussed, this duplication is exploited on the musical surface: in the strings, pc(9) and pc(8) (in that order) frame the \([2,7]\) ics-dyad; and as a mirrored response, the clarinet’s pc(8) and pc(9) (in
that order) frame their $[10,3]_\text{ic}_5$-dyad. Pc(4) and pc(5), needed to complete the aggregate, now stand alone and their special timbre indication on the score seems to reflect their role in the completion process.

What is even more interesting in regard to Davidovsky’s use of the symmetrical (0127) set-class, with its special N–Sn primary and secondary degrees, is its connection to the previous asymmetrical (0157) set-class that had been at the heart of the musical continuity up until this point in *Quartetto No.4*. The set-classes are very similar: they both contain three ic$_5$-related pitches, and only differ in the intervallic content of the fourth. As previously mentioned, the lopsided fourth pitch is the core of the asymmetry of the (0157) set class for Davidovsky. Here, at the end of the first section of the piece, this lopsided pitch has “corrected” itself, creating the symmetrical (0127). Figure 2–30 marks this transformation.

![Diagram](image)

**Figure 2–30: The asymmetrical (0157) set-class becoming the symmetrical (0127) set-class**
The transformation of the asymmetrical (0157) set-class into the symmetrical (0127) set-class through a semitonal shift is the main trait of the primary N–Sₙ property. The near-symmetry table for the asymmetrical tetrachords is below. And Figure 2–31 shows them in the asymmetrical continuum.

<table>
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<tr>
<th>set-class</th>
<th>N–Sₙ</th>
<th>set-class</th>
<th>N–Sₙ</th>
</tr>
</thead>
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<td>(0148)</td>
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<td>(0157)</td>
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</tr>
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<td>0</td>
</tr>
<tr>
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<td>5</td>
</tr>
<tr>
<td>(0146)</td>
<td>4</td>
<td>(0258)</td>
<td>6</td>
</tr>
</tbody>
</table>

**Table 2–3. List of asymmetrical tetrachords with their degree of N–Sₙ**

![Figure 2–31. The asymmetry continuum of tetrachord set-classes](image)
Notice that the (0157) set-class collection ranks high in its symmetry potential among the asymmetrical tetrachords: it is a semitonal move away from five symmetrical set-classes. The (0127) set-class is only one of those five. This means that Davidovsky had other options to choose from, assuming his purpose was to transform the (0157) set-class into a symmetrical tetrachord. He nevertheless chose a resolution into a (0127) set-class, which as previously shown, is the least symmetrical of the symmetrical tetrachords. Interestingly, these collections share both the (016) and (027) set-classes as subsets. This is important, because it clarifies the abstract large-scale continuity process: for the composer, the (0127) set-class is the symmetrical tetrachord that can follow the asymmetrical (016) set-class if we choose the asymmetry path away from the perfect fifth seed. See Figure 2–32.

**Figure 2–32.** The symmetrical–asymmetrical pattern in its two paths emanating from the smallest common denominator, the perfect fifth. The near-symmetry property connects the (0157) and (0127) set-classes

At the start of this chapter, I demonstrated how the asymmetrical (0157) set-class was becoming symmetrical by adding a particular pitch to the collection (i.e., creating symmetrical
pentachords out of asymmetrical tetrachords). Here, at the end of the first section of the piece (m.35, after the above aggregate discussed in Figure 2-29), the (0157) set-class is becoming symmetrical by correcting one of its pitches with a semitonal shift. This is the difference between the two perspectives of the concept of near-symmetry: $N-S_n$ (moving a pitch) and $N-S_{n+x}$ (adding pitches).

To summarize what has been said up until now: the concept of near-symmetry involves two perspectives. The first, $N-S_n$, implies a reinterpretation of the asymmetrical property within the same cardinality as a continuum, not as a fixed state. The second, $N-S_{n+x}$, deals with the idea that asymmetrical collections can become symmetrical when adding pitches to them. This property opens up the possibility of comparing different cardinalities, and fits nicely with Davidovsky’s potentiality–actuality processes. For our purposes we will only work with $N-S_{n+1}$ processes, as we are adding one pitch to the asymmetrical collection in order for it to become symmetrical. Multiple examples of this property were provided at the start of this chapter. All four SymP–A $(n+1)$ processes that started *Quartetto No.4* are exploring this concept. The method of acquiring the degree of $N-S_{n+1}$ involves simply exhaustively adding pitches to the already existing collection, and extracting the symmetrical sets that result. Below is the process for the (0157) set-class.24

---

24 I am omitting the possibilities for supersets purposefully in the method of extracting the degree of $N-S_{n+1}$ of asymmetrical tetrachords. Supersets, while theoretically interesting, are not particularly relevant to the music at hand.
The degree of $N-S_{n+1}$ of the (0157) set-class is 1: it can only become symmetrical when adding one specific pitch-class. Adding any of the other eleven pitch-classes will yield asymmetrical pentachords. We are thus facing a collection that had a very high degree of $N-S_n$ (it could become five symmetrical tetrachords by moving one of its members by a half step), but a very low degree of $N-S_{n+1}$ (it can only become the symmetrical (01268) pentachord). As we saw at the start of this chapter, the low degree of $N-S_{n+1}$ property of the (0157) set-class is the driving force behind Davidovsky’s SymP–A processes. Below is the complete table of the degrees of $N-S_{n+1}$ of the asymmetrical tetrachords.

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Table 2–4. List of asymmetrical tetrachords with their degree of $N-S_{n+1}$
A few observations on this list: first, the two all-interval tetrachords (0137) and (0146) have a N–S_{n+1} degree of 0, a behavior that up until now seemed reserved only for symmetrical sets; second, the highest degree of N–S_{n+1} belongs to the (0148) set-class, which can become three symmetrical pentachords (out of an already short list of ten); third, nine out of the fourteen asymmetrical sets have an N–S_{n+1} degree of 1 (making any other degree particularly unique); and lastly, the (0247) set-class is alone with its degree N–S_{n+1} of 2. That so many of the tetrachords have an N–S_{n+1} degree of 1 shows that the (0157) tetrachord isn’t particularly special in regards to its N–S_{n+1} property. What makes this tetrachord special is the combination of both perspectives of near-symmetry, N–S_{n} and N–S_{n+1}. See below.

<table>
<thead>
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<tr>
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</table>

Table 2–5. List of asymmetrical tetrachords with their degree of N–S_{n} and N–S_{n+1}
In the table above, which combines both N–S_n and N–S_{n+1} degrees of the asymmetrical tetrachords, I’ve marked the set-classes that show unique properties. The two all-interval tetrachords are, interestingly, quite different from each other: they share the N–S_{n+1} degree of 0 (a unique property among asymmetrical tetrachords), yet while the (0137) set-class can only become one symmetrical tetrachord within the primary N–S_n property (the (0248) set-class), the (0146) set-class can become a total of four symmetrical tetrachords. Our (0157) set-class is the only tetrachord besides the (0258) set-class with a high degree of N–S_n, and a low degree of N–S_{n+1}. Lastly, the (0148) and (0247) set-classes stand out as having above-average degrees in both.

Let us look at a few more concrete examples. Example 2–8 shows mm.74–76 of Quartetto No.4.

Example 2–8. The asymmetrical (0135) set-class becoming the symmetrical (0145) set-class, another example of the N–S_n property (Quartetto No.4, mm.74–76)
The (0135) set-class can become symmetrical within the primary N–Sₙ property via three ways, it has a degree of N–Sₙ of 3: the (0134), (0145), and (0235) set-classes. In the example above, found in the middle section of the piece, Davidovksy chooses to move the upper B₅ in the violin up a half step to C₆ in m.76, and have the ensemble rest on the resulting symmetrical (0145) set-class. So it would seem that the composer has chosen the symmetrical (0145) as the resolution of the asymmetry of the (0135) set-class. Indeed, the (0135) set-class shares the (015) subset with the resulting (0145) set-class, a circumstance not shared with the two other possible candidates, the (0134) and (0235) set-classes. Figure 2–33 maps this transformation within the ic₁-MOD₁₂ space.

Figure 2–33. The asymmetrical (0135) set-class collection resolving its asymmetry into the symmetrical (0145) set-class (Quartetto No.4, mm.74–76)
Example 2-9a: The symmetrical (0257), gesture A, and asymmetrical (0147), gesture B; and their transformations (Quartetto No.2, mm.1–8)
Example 2–9a above shows the first eight measures of *Quartetto No.2*. The oboe starts the piece with two gestures, labeled A and B. Gesture A is a symmetrical (0257) set-class, a triplet-plus-8\textsuperscript{th} note figure grouped together by the phrase marking. Gesture B, with similar rhythm and phrasing, is an asymmetrical (0147) set-class. After both rapid figures are introduced, the oboe rests for a quarter triplet before repeating and sustaining the B♭4 that ended gesture B over the string trio’s entry. Figure 2–34 below (two embedded ic\textsubscript{5}-MOD\textsubscript{12} spaces) maps the symmetrical gesture A on the outside circle, and the asymmetrical gesture B on the inside, for clarity purposes.

**Figure 2–34.** The oboe’s two gestures: A, a symmetrical (0257) set-class; and B, an asymmetrical (0147) set-class (*Quartetto No.2*, m.1)

Figure 2–35 below traces their transformations in mm.2–3, and 7.
Figure 2–35. Gesture A is answered by a (0358) set-class in violin and viola, while gesture B returns in the oboe with the tritone exchange pc(10)–pc(4), creating a (0136) set-class 

(Quartetto No.2, mm.1–3, and 7)

The symmetrical gesture A is answered in the viola and violin with a second symmetrical tetrachord in m.2, this time a (0358) set-class. The oboe’s original (0257) set-class is a cyclic tetrachord, created by an incomplete ic₅-cycle—in the figure above I’ve segmented it into two ic₅-dyads. Its transformation into the (0358) set-class involves an expansion of the distance between these ic₅-dyads. The (0358) set-class is not cyclic, though it retains the TC–property also inherent in the original (0257): it can be constructed by two ic₅-dyads a minor third apart. The distance between the segmented ic₅-dyads has expanded in the transformation, from two ic₅-dyads an ic₂ apart to two ic₅-dyads an ic₃ apart.
Gesture B, shown in the inner circle, retains the (016) subset as the B♭4 in the oboe exchanges places with the E5 in mm.2–4. This tritone exchange transforms the original (0147) set-class of gesture B into a (0136) set-class. The transformation occurs in steps: gesture B in m.1 contains the pitch-set [6,7,10,1]; in m.3, pc(10) and pc(4) exchange; and in m.7, gesture B returns in the oboe with pc(4) instead of pc(10) as the pitch-set [1,4,6,7], a (0136) set-class. Both of the collections are asymmetrical, and share the same degree of N–S_n and N–S_{n+1}.

\[
\begin{align*}
(0147) \ N–S_n &= 0 / N–S_{n+1} = 1 \\
(0136) \ N–S_n &= 0 / N–S_{n+1} = 1
\end{align*}
\]

Both collections have a primary degree of N–S_n of 0, which means they cannot become symmetrical by moving any of its members parsimoniously. Their N–S_{n+1} of 1, however, tells us that they both can become symmetrical pentachords with the addition of one particular pitch. Even more interesting, both pitch-sets, as Davidovsky wrote them, need a pc(2) in order to become symmetrical pentachords. Gesture B, the [6,7,10,1] pitch-set, becomes the symmetrical (01478) with the addition of pc(2); its transformation, the [1,4,6,7] pitch-set, becomes a symmetrical (01356) with the addition of pc(2). Gesture B and its transformation are the first and second SymP–A (n+1) processes of the piece.

\[
\begin{align*}
[6,7,10,1] + [2] &= \text{symmetrical (01478)} \\
[1,4,6,7] + [2] &= \text{symmetrical (01356)}
\end{align*}
\]

Figure 2–36 maps them within an ic_1-MOD_{12} space.
Figure 2–36. The [6,7,10,1] and [1,4,6,7] asymmetrical tetrachords becoming the [6,7,10,1,2] and [1,2,4,6,7] symmetrical pentachords with the addition of pc(2)
Despite the fact I’ve shown these two pitch-sets within an ic$_1$-MOD$_{12}$ space, it is easy to see that their actualities also contain two ic$_5$-dyads, similarly to the symmetrical gesture A. These ic$_5$-dyads, [1,6] and [2,7], are the same in both expected pentachords.

These two collections are not the only ones seeking pc(2) for actuality in these measures. Example 2–9b below shows the first eight measures again, this time annotating a third SymP–A (n+1) process working in Davidovsky’s *polyphony-of-space* counterpoint starting in the cello in m.2.
Example 2–9b. $Pc(2)$ is also the actuality of the SymP–A process occurring in the cello and oboe, two (0124) set-classes (Quartetto No.2, mm.1–8).

Figure 2–37 maps this third SymP–A ($n+1$) process within the $\text{ic}_5\text{-MOD}_{12}$ space.
Figure 2–37. The initial (0124) set-class in the cello is answered by a potentiality for (0124) in the oboe. Pc(2) arrives in m.5, a strong downbeat in the viola (Quartetto No.2, mm.2–5)

The cello enters with a pc(9) in m.2, combined with its expressivo pc(0) neighbor motion to create a symmetrical [9,11,0,1] pitch-set, member of the (0124) set-class. In m.4, when the oboe is finished with the tritone exchange already described as part of the second SymP–A \((n+1)\) process, it answers the cello with a [3,4,6] pitch-set, lingering over the barline with pc(4), as if waiting for the expected pc(2) that would resolve its asymmetry by becoming another (0124) set-class.

Pc(2) arrives at the downbeat of m.5 in the viola. It is singled out with sforzando-triple-piano-subito dynamic, and sustained for more than three measures. This pc(2) actualizes all three SymP–A \((n+1)\) processes: the first two were part of gesture B, as explained in Figure 3–36a-b and the third one is the one just described in Figure 3–37.
As is common with Davidovsky’s musical continuity, this pc(2) doesn’t occur alone. Throughout the transformations of the A and B gestures, and the third SymP–A \((n+1)\) process in the cello and oboe already shown, there are two underlying \(i_{c_2}P–A\) processes at work in the composers’ counterpoint. See Example 2–9c.
Example 2–9c. Two ic₂P–A processes: pitch-set [0,2,4,6] seeking [8,10] and pitch-set [1,3,5,7] seeking [9,11]; and a 3rd variation of gesture B in the oboe, the asymmetrical [6,8,11,2] pitch-set (Quartetto No.2, mm.1–8)
The first ic$_2$P–A process starts in the violin in m.5 as it exchanges pc(5) and pc(3), resolving in a tritone leap from pc(7) to pc(1) in m. 8. This closing gesture is reinforced in all voices, and pc(1) is the first full ensemble unison of the work. The second ic$_2$P–A process is handled by the cello, in collaboration with the viola’s already structural pc(2), starting in the last beat of m.4 moving through pc(0), pc(2), pc(4) and pc(6). This process is annotated with double circles in the example. Figure 2–38 maps them onto the ic$_5$-MOD$_{12}$ space.

![Diagram](image)

**Figure 2–38. The two incomplete ic$_2$-cycles, interlocking within the aggregate**  
*(Quartetto No.2, mm.5–8)*

Both processes are incomplete, as they each deal with two thirds of the even and odd ic$_2$-cycles. The first process is presented out of order, so to speak, as pc(5) and pc(3) are heard before the ending tritone leap [7,1]. The presence of the [3,5] dyad in the violin, in the high register, seems to foreshadow the entrance of the B♭5 in the oboe at the end of m.7, a pitch that
stands out as being the first triple *forte* (with a crescendo) of the piece—I will return to this shortly. Notice that because of the miscommunication between the ic₂P–A processes, they are missing four pitches in the aggregate, the chromatic [8,9,10,11] pitch-set. Out of those four pitches, pc(8), pc(9) and pc(11) have been played before: pc(11) was in fact doubled in m.3, as it was part of the strings (0358) set-class that transformed gesture A; pc(9) was heard in gesture A itself in the oboe in m.1, and it was reinforced by the cello in m.2 as the start of the third SymP–A \((n+1)\) process that was seeking pc(2) for actuality; pc(8), as pc(11), was also part of the strings’ (0358) set-class in m.3, and it is also revisited by the oboe in m.7—it is the pitch that starts the gesture building up to the singled-out \(B♭5\). This \(B♭5\) is the first pc(10) of the piece, and completes the aggregate.

As seen in Example 3–9c above, this \(B♭5\) in the oboe at the end of m.7 is arrived at by yet another variation of the asymmetrical B gesture, a pitch-set \([6,8,11,2]\), member of the asymmetrical (0258) set-class.

\[
(0258) \ N–S_n = 6 / N–S_{n+1} = 1
\]

As previously stated, the (0258) collection has the highest degree of \(N–S_n\) of the asymmetrical tetrachords—it can become six symmetrical tetrachords by moving any of its voices parsimoniously. This particular (0258) is written out as the pitch-set \([6,8,11,2]\)—all that is needed is to move pc(2) down a half step to pc(1) in order to convert the collection into a symmetrical (0257) set-class, our original gesture A. Remember, pc(1) is the full ensemble unison that closes these introductory eight measures. See Figure 2–39.
Figure 2–39. The [6,8,11,2] pitch-set becoming a (0257) set-class by moving pc(2) parsimoniously to pc(1) (Quartetto No.2, mm.7–8)

Davidovsky’s complex continuity can be summarized in the following way: the oboe’s asymmetrical gesture B in m.1 (the (0147) set-class) and its transformation (the (0136) set-class product of the tritone exchange pc(10)–pc(4) that is solidified in m.4) both are SymP–A \((n+1)\) processes in search for pc(2) to become symmetrical pentachords (see Figure 3–36); a third SymP–A \((n+1)\) process starts with the cello in m.2, and it is also seeking pc(2) (see Figure 2–37); this pc(2) appears in the viola in m.5, yet is entangled in an \(i_{c2}\)-cycle process (see Figure 2–38); finally, pc(2) appears as the “wrong” note in the oboe’s asymmetrical (0258) set-class in the second half of m.7 (see Figure 2–39), as if it lingered for too long once achieved.

Example 2–9 below shows the ending of the piece.
Example 2–10. The symmetrical collections at work in the ending

*(Quartetto No.2, mm.214–222)*

Figure 2–40 below maps the collections at work in the ending within the ic₅-MOD₁₂ space.
Figure 2–40. The symmetrical (0127) set-class that ends the oboe line; and the symmetrical (012378) verticality that ends the piece (Quartetto No.2, mm.214–222)

It would seem that Davidovsky’s primary segmentation of the (0127) set-class is, as in Quartetto No.4, three ic5-related pitches, plus an added note. Notice the E♭4 trill that prepares the final gesture in the oboe (mm.216–219), and the ending G5, balancing the symmetry. Notice that this (0127) set-class is played with the same rhythm and phrasing as the starting oboe gestures A and B. The two pitches that frame the gesture, pc(3) and pc(10) expand the ic5-related pitches to five.

The string trio plays a last verticality in the form of a [1,2,3,4,8,9] pitch-set. I’ve segmented this collection into two sub-collections. A (0156) set-class, played in the viola and cello as two pairs of fifths one half step apart, fills in the aggregate on both sides of the (0127)
set-class. Remember, gesture A in the oboe (m.1) had two pairs of fifths a whole tone away, and its transformation by the violin and viola in m.2 presented two pairs of fifths a minor third away. Davidovsky combines both gestures in this ending $[8,9,1,2]$ pitch-set verticality: he returns to the $[9,2]$ ic$_5$-dyad from gesture A, and to the $[8,1]$ dyad from its transformation, creating thus another set-class with TC–property, the (0256) collection. This set-class is compressing the distance of the segmented fifths as much as possible to a half step (in the ic$_5$-MOD$_{12}$ circle this distance is deceptive because of the nature of the circle of fifths). The viola plays a double stop, which completes the ending chord: a $[3,4]$ ic$_1$-dyad. Pc(3) is thus doubled, working in Davidovsky’s mind perhaps as the glue between both ending gestures.

These last two gestures on the part of the oboe and strings complement each other in the aggregate, unlike at the start of the piece. The two remaining pitch to complete this localized aggregate, pc(6), had been achieved previously (not shown).

§ 2.4 A Brief Conclusion

The complexities of the symmetrical processes seen in Quartetto No.2 are simplified in Quartetto No.4, yet nevertheless the technique is the same: the potentiality for symmetry—be it by adding pitches to an asymmetrical collection, or by correcting one of its pitches in search for balance—is a main driving force in the musical continuity. Of special note is the roguishness of Davidovsky’s large-scale symmetrical processes: rarely does he complete an aggregate following a single procedure. This, I believe, truly separates his compositional method from the serial composers of his generation, and accounts for the uncontainable agency of various musical elements in his discourse. I am not suggesting that the listeners are capable of hearing and/or perceiving the symmetrical potentialities reaching actuality, and then shifting axis within a larger
aggregate process—that would take a very special kind of listener. In fact, I am not interested in validating these findings based on any kind of perception theory. I am suggesting, however, that the composer is very much aware of his abstract musical constructions, and is very precise when realizing them on the musical surface. As we’ve seen, this level of detail includes very specific timbral treatments of the pitch events that are structurally important in the musical continuity and formal design (e.g., pitches that complete aggregates, or actualize potentiality processes), a clear impulse toward a particular musical clarity.

In a previous conversation with the composer, he referred himself as a Classicist (this statement was in fact the second clause in the phrase that started with “I am not a Serialist”). There are two aspects of his music that I believe reflect this statement. The first one is the rhetorical technique of exposing pitch problems that the piece needs to resolve, à la Haydn. The percussive attacks of the asymmetrical (0157) set-class at the start of Quartetto No.4 being balanced into the symmetrical (01268) set-class by a solo, sustained G in the cello is only one example. It would seem that Quartetto No.4 has a purpose: to deal with the asymmetry of the (0157) set-class. This aspect of his discourse, deeply rooted in the formalist aesthetic, seems an essential element in understanding his music.

The second aspect is what I was referring to above in regard to the clarity of his musical surfaces, which includes clarity of formal structure as well. His technical process is rarely hidden from surface realizations. The most common example of this refers to particular actuality events being treated with special care in regards of their instrumentation and orchestration. We will see several examples of this clarity in Chapter Three.
CHAPTER THREE

Interval Cycle Potentiality—Actuality Processes in Quartetos No.1 and No.3

§ 3.1 Quartetto (No.1)

Example 3–1 below shows the first fifteen measures of Quartetto (No.1). The piece starts with a string unison pitch C4 marked triple piano, with no vibrato (incidentally, the triple piano will remain as the overall dynamic until m.40, to be discussed shortly). If we pay attention to the emphasized pitches that follow in the flute’s phrase (an emphasis based on rhythm and contour), we can hear the F5 in m.4 as a response to this opening C4, then followed by the low Eb4 and the high B♭5 in mm.6–9.

Example 3–1. Start of the ic5-cycle, from C4 to D♭4 (Quartetto (No.1), mm.1–15)
These two ic₅-dyads (C–F and E♭–B♭) create the pitch-set [10,0,3,5], a member of the cyclic (0257) set-class, and they signal the start of an ic₅P–A process moving clockwise through the ic₅-MOD₁₂ space. See Figure 3–1.

Figure 3–1. Two ic₅-dyads, C–F and E♭–B♭, start the ic₅P–A process

(Quartetto (No. 1), mm.1–9)

The solid arrows in the figure expose the symmetrical aspect of this structure. In the first ic₅-dyad, pc(0) (the lower C4 in the strings) moves to pc(5) (the higher F5 in the flute). The second ic₅-dyad mimics this gesture in retrograde, the lower E♭4 in the flute, pc(3), triggers its higher B♭5 partner, pc(10). The arrows (which show the directionality of the pitches played) by design point to the axis of symmetry of the resulting set.

The ic₅P–A process continues as the strings present another unison, this time on pitch A♭4 in m.10. Its ic₅-dyad is achieved when the flute rests on the D♭4 in mm.13–15, after lingering on
the A♭4 and B♭5 sonorities. This third ic5-dyad is treated as the closure of the introductory fifteen measures: pc(8) and pc(1) sound together as a verticality—the first of the piece. In fact, as seen in Example 3–1 above, the A♭4 in the strings returns after a measure rest, and lingers for four measures, patiently waiting for the flute to rest on the “right” note. See figure 3–2 below.

Figure 3–2. A 3rd ic5-dyad, A♭–D♭, is added to complete the 1st half of the ic5-P–A process, the (024579) hexachord (Quartetto (No.1), mm.1–15)

The resulting [8,10,0,1,3,5] pitch-set, a member of the all-combinatorial (024579) set-class (the diatonic hexachord), now completes half of the ic5-P–A process. Notice how the instrumental forces reinforce the axis of symmetry as the cycle unfolds: the second ic5-dyad ([10,3], the axis of symmetry) is the only pair handled entirely in the flute, as it is also the only pair played “in reverse” (i.e., E♭4 sounded before B♭5); the first and third ic5-dyads ([0,5] and
[8,1)] are each handled by the strings and flute (in that order) and are played clockwise through the $ic_5$-MOD$_{12}$ space.

In order to actualize this $ic_5\text{P}-A$ process we are now expecting the second half of the cycle, a second diatonic hexachord in the form of the pitch-set [2,4,6,7,9,11]. Example 3–2 shows the following six measures of *Quartetto (No. I)*.

Example 3–2. Embedded $ic_3$-cycle and 1st full ensemble unison gestures, in preparation for the expected hexachord complement that would actualize the $ic_5\text{P}-A$ process (*Quartetto (No. I)*, mm.16–21)

Instead of directly continuing with the $ic_5\text{P}-A$ process, Davidovsky inserts a shorter $ic_3$-cycle that is quickly actualized within a few measures. $pc(0)$ and $pc(3)$ are the start and end of the unison melodic line, which is followed by the $ic_3$-dyad [6,9] that sustains briefly before the full ensemble unison $pc(2)$. This is a clear example of his polyphony-of-space counterpoint, translated in this instance to two contrapuntal lines in the form of a long cycle (the $ic_5$-cycle, the longest possible as it goes through the entire aggregate), and a short one (the $ic_3$-cycle, which
only goes through four pitches before repeating itself). Pitch D4 (the full ensemble unison) in mm.20–21 will return our attention back to the ic₅P–A process—we will see shortly where it leads. Figure 3–3 below maps the thus-far-incomplete ic₅P–A process (with its move to the D4) and the embedded ic₃-cycle within the (01356) Tonnetz.

Figure 3–3. The incomplete ic₅-cycle (in the form of the diatonic hexachord) moving upwards through the space, and its lateral move to the full ensemble unison D4; and the complete ic₃-cycle, embedded within the musical continuity (Quartetto (No.1), mm.1–21)

Pc(0) is the starting point for both cycles: it is the first pitch of the piece (the string unison C4 that started the ic₅P–A process) and it is the first pitch of the more accelerated unison melodic line in m.17 that jump starts the ic₃-cycle. Figure 3–3 above also shows the lateral move in the (01356) Tonnetz from pc(1), the flute’s Db₄ in mm.13–15 that ended the first half of the ic₅P–A
process (the diatonic hexachord), and pc(2), the full ensemble unison D4 that continues such process. The parsimonious move in pitch-class space is realized as such on the surface of the music, as the D♭4 in mm.13–15 moves a half step up to D4 in mm.20–21.

Once the choice of pitch D4 as the continuation of the ic5P→A process has been set, Davidovsky only has one option if he wants to complete the cycle via ic5-dyads, which is to move down through the Tonnetz (counterclockwise through the ic5-MOD12 space) from pc(2): pc(9), then pc(4), etc. Example 3–3 below shows measures 22–36 of Quartetto (No.1).
Example 3–3: Continuation of the ic₅P–A process (*Quartetto (No.1), mm.22–36*)

The full ensemble unison D⁴ previously heard in mm.20–21 is now transferred to the cello in m.22 (heard as a harmonic) and triggers the search for its lower ic₅-companion (pitch A),
which is finally heard in the viola (also as a harmonic) in mm.26-28. This [9,2] dyad, filling in the space of mm.22-28, constitutes the fourth structural ic5-dyad of the piece, and moves along the ic5P–A process. I will comment on the composer’s choice of continuing the ic5-cycle in this manner shortly, for it has serious consequences for the overall musical continuity of the piece. For now, see Figure 3–4 below.

Figure 3–4. Continuation (and expected actuality) of the ic5P–A process: the 4th structural ic5-dyad [2,9] is overshadowed by pc(0), pc(7) and pc(4) harmonics

*(Quartetto (No. I), m.22)*

Example 3–3 and Figure 3–4 above also show how Davidvosky seems to be playing with the directionality of the process by including several Gs and Cs in the melodic lines at work within this [9,2] ic5-dyad that frames these measures: see the unison G4–C4 gesture in m.23 in
flute, violin and viola, or the high G5 moving to the low C4 in m.29 also in flute, violin and viola as examples. Pc(7) and pc(0) would indeed imply an ascending ic5-cycle, and in essence the start of the ic5P–A process over again. Notice as well the E harmonics coloring the passage.

The full ensemble unison line in mm.29–30 seems to assert the “correct” direction of the process by means of an ascending chromatic line from pc(11) to pc(4), the next expected ic5-dyad. This partial ic1-cycle has the same functionality as the ic3-cycle did in the previous mm.17–20. The embedded ic1-cycle adds a new layer in our polyphony-of-space counterpoint, and provides continuity toward the next target (in this case, pc(4), which had been foreshadowed by the sustained harmonics in mm.22-28), which in turn will continue the ic5P–A process as expected. Unlike the previous ic3-cycle, this embedded ic1-cycle will remain, for now, incomplete. See Figure 3–5 below.

Figure 3–5. The 4th ic5-dyad [9,2] followed by the 5th ic5-dyad [11,4] which is prepared by an embedded ic1-cycle from pc(11) to pc(4) (Quartetto (No.1), mm.22–32)
The pitch B4 within the full ensemble unison line in m.29 that starts the ic₁-cycle, and the targeted E4 achieved at the end of m.30 are restated in a cadence-like gesture in mm.31–32, preceded by two beats of rests. This fifth ic₅-dyad is structurally very sound, and solidifies the ic₅-P–A process. See Figure 3–6, which now reduces the musical continuity to the main ic₅-P–A process, omitting the embedded shorter cycles and other surface pitches.

Figure 3–6. The ic₅-P–A process mapped within the ic₅-MOD₁₂ space: the 1ˢᵗ half of the ic₅-cycle is achieved clockwise from pc(0) to pc(1); its continuation moves counterclockwise starting from pc(2); only two ic₅-dyads are possible on the 2ⁿᵈ half of the cycle

(Q uartetto (No.I), mm.1–36)

Figure 3–6 above portrays a clear example of the rogue-like spirit of Davidovsky’s compositional technique: once the first half of the ic₅-P–A process is complete, he could have continued through the circle of fifths in the same manner. After the [8,1] dyad, [6,11] would have
followed, and so forth, until completing the ic₅-cycle. Instead he chose to “jump” after completing the initial (024579) hexachord to pc(2) (the full ensemble unison D4 in mm.20–21), a decision which offset the dyad segmentation of the aggregate so that pc(2) was paired thus with pc(9), triggering the [11,4] ic₅-dyad, moving along counterclockwise within the ic₅-MOD₁₂ space. The main consequence of this decision is that pc(7) and pc(6) are not able to be part of an ic₅-dyad without duplicating a pitch within the aggregate-forming process. In regards to pc(7), this might be the reason behind the directionality games played at the start of the second half of the ic₅P–A process, as described previously. In regards to pc(6), however, there hasn’t been an emphasized F♯ or G♭ in the music up until this point, and thus it seems to be the actuality of the entire ic₅P–A process. An observation which leads to an important realization: since Davidovsky does seem interested in providing pairs of fifths as structural arrivals, we can expect a sixth structural ic₅-dyad: the missing pc(6), and its lower ic₅-companion, pc(1). With this chain of choices (specifically, jumping to pc(2) and its consequences on the dyad segmentation of the ic₅-cycle) Davidovsky has set himself up to double the ending pitch of both halves of the process, pc(1).

The [1,6] pair is indeed heard in the following measures: mm.34–36 in Example 3–3 (shown again below for convenience) circles the F♯5 in the flute as part of an ascending ic₂-cycle (E–F♯–G♯–A♯), and the C♯ in the strings, which is the starting pitch of yet another unison melodic line.
Example 3–3. Continuation of the ic₅P–A process (*Quartetto (No. I)*, mm.22–36)

Remember that the first half of the ic₅P–A process ended with the flute’s D♭4 paired with
the strings A♭4 in mm.13–15—pc(1), which was then accompanied by its upper ic5-companion, pc(8), as approached clockwise through the ic5-MOD12 space. Now, it is approached counterclockwise, and pc(1) will be accompanied by its lower ic5-companion, the missing pc(6). See Figure 3–7a.

Figure 3–7a. The structural ic5-dyads that segment the ic5P–A process. Pc(1) is doubled, and thus the resulting diatonic hexachords are not complementary

*(Quartetto (No. 1), mm.1–36)*

The second half of the ic5P–A process, from pc(2) to pc(1), also creates a diatonic hexachord formed by the ic5-dyad segmentation of the ic5-cycle. This [2,4,6,7,9,11] pitch-set, however, is not the complement of the first hexachord heard in mm.1–15, as they double pc(1). This doubled pc(1) cues the axis of symmetry of the entire gesture, which also inverts around
pc(7), singled out by the composer in the directionality games played in mm.22–28.

Two important clarifications need to be made about this moment of actuality. First, unlike the previous five ic₃-dyads, the [1,6] dyad seems weak. While the F♯₅ in the flute lingers alone for an eighth note in the 3/8 measure and then briefly sustains before the strings’ C♯₄, this overlap is very short. More noteworthy, however, is the flute’s ascending line itself, in which this F♯₅ is just the second note. The short overlap within the ascending gesture prevents us from hearing these two pitches, pc(6) and pc(1), as connected. The overall “frame” of the ic₃-P–A processes up until this moment was crafted by the pcs[0], [1] and [2], all of which were very salient on the surface of the music. C₄ was the string unison that started the piece and the process itself, D♭₄ was the ending pitch in the flute’s melodic line in mm.14–15 which ended the first half of the process, and the D₄ in m.20, the first full ensemble unison of the piece, began the second half of the process. Although all four pitches are written in the same range, this return to C♯₄ in m.36 is weak in comparison. See Figure 3–7b below.
Figure 3–7b. The structural ic5-dyads that segment the ic5P–A process. The [1,6] dyad (the 6th pair) has a weak musical surface realization in comparison to the other five

(Q uartetto (No. 1), mm.1–36)

The weakness of the return to pc(1) will have ramifications in the overall continuity of the piece. I will return to this very shortly. The second important clarification is in regard to the embedded incomplete ic2-cycle that includes the F♯5 in the flute (pc(6)), the first note of the weak sixth ic5-dyad we’ve been discussing. Up until this moment, two other embedded shorter cycles were present within the longer ic5P–A process: the ic3-cycle in mm.17–19 (the completed ic3P–A process shown in Figure 3–3), and the ic1-cycle in mm.29–30 (the incomplete ic1P–A process shown in Figure 3–5). Figure 3–8 below maps this new embedded incomplete ic2-cycle present in mm.34–36, and Figure 3–9 maps all three embedded cycles.
Figure 3–8. The embedded, incomplete ic₂-cycle within the ic₅P–A process

*(Quartetto (No.1), mm.34–36)*
Figure 3–9. The three embedded shorter cycles within the ic$_5$P–A process: the completed ic$_3$-cycle in mm.17–19; the incomplete ic$_1$-cycle in mm.29–30; and the incomplete ic$_2$-cycle in mm.34–36 (Quartetto (No.1), mm.1–36)

Four different interval cycles are thus present in these first thirty-six measures. Besides the main ic$_5$P–A process (moving up and down in the Tonnetz), the other complete cycle was the embedded ic$_3$-cycle in mm.17–19 (moving along the diagonal, from bottom-left to top-right). The ic$_1$P–A process in mm.29–30 (moving from left to right in the Tonnetz) was, however, incomplete. Its actuality, the remaining hexachord to complete the aggregate, pitch-set [5,6,7,8,9,10], wasn’t a priority for the composer. The goal was instead the chromatic filled-in perfect fourth from pc(11) to pc(4)—the fourth structural ic$_5$-dyad of the main ic$_5$P–A process. The last represented cycle, the ic$_2$-cycle process in the flute in mm.34–36 (moving along the
other diagonal), was also incomplete, as the ascent from pc(4) to pc(10) in the flute does not continue—it is missing pc(0) and pc(2) for completion. These pitches are, not coincidentally I presume, the starting pitches of the first and second half of the ic₅P–A process.

Let us return to the idea of the weak doubling of pc(1) at the end of the ic₅P–A process in m.36, and notice how, as shown in Example 3–3, it has been respelled as a C♯4 (previously, in mm.14–15, the flute had played it as a D♭4). This enharmonic respelling is significant because it clarifies on the musical surface the importance of this doubling in Davidovsky’s mind. Figure 3–10 below amends the previous Figure 3–7 by adding the two spellings of pc(1).

![Diagram of ic₅-dyads]

**Figure 3–10.** The structural ic₅-dyads that segment the ic₅P–A process. The doubled pc(1) is enharmonically respelled when it returns in m.36 (*Quartetto* (No.1), mm.1–36)

I connect this important enharmonic spelling of pc(1) to Davidovsky’s concept of sameness
previously discussed in Chapter One, an idea that ultimately grows from his musical organicism: multiple things become one, or, most importantly, multiple things were one all along—the C♯4 in m.36 is the same pitch-class as the D♭4 in mm.14–15, yet they are, in fact, not the same. The C♯4 marks the return to pc(1) after a long interval process that has shaped the musical continuity for more than thirty five measures—the journey itself has shaped the process in such a way that both endings of the first and second halves can not musically, philosophically, or emotionally be the same.

The concept of sameness is even more significant once we analyze the start and end of the ic5–A process. At the end of the ic5-cycle (which would normally take us through all twelve notes of the aggregate), we find ourselves a half step above from where we started—it would seem as if the circle of fifths has tricked us. The string unison C4 in the first measure of the piece now seems very distant, but its relationship to its weaker counterpart C♯4 is structurally significant once we uncover the ic5–A process that connects them. Obviously, pc(0) and pc(1) are not the same, yet Davidovsky has paired them as if they were. This pairing has important consequences for the rest of the piece. Example 3–4 below shows the last three measures of Quartetto (No.1).
Example 3–4. Pc(1) returns as the last note of the piece, and is treated with the same surface elements as the initial \( \text{pc}(0) \) (Quartetto (No.1), mm.255–257)

Notice the return of the delicate dynamic, and the \textit{sul tasto, senza vibrato} indication that ties this ending \( \text{C}^\#4 \) to the starting \( \text{C}4 \) (which had the same indications). I will return to the rest of the notations on this example shortly; let us stay focused on this ending pitch a little longer. This ending full ensemble union \( \text{C}^\#4 \) is previously prepared by another full ensemble unison \( \text{pc}(8) \), spelled as a very high \( \text{G}^\#6 \), played \textit{a tutta forza} in m.250. See Example 3–5 below.
Example 3–5: \( \text{Pc}(8) \), now spelled as a high \( G\#6 \), prepares the ending \( \text{pc}(1) \), in a cadence-like gesture (\textit{Quartetto (No.1)}, mm.248–250)

The ic\textsubscript{5}-related dyad [8,1] respells in sharps the third ic\textsubscript{5}-dyad heard in m.13–15 (which was then spelled as A\#4 and D\#4 and marked the end of the first half of the ic\textsubscript{5}P-A process). Example 3–6 below shows these measures again for convenience.
Example 3–6. Start of the ic5-cycle, from C4 to D♭4 (Quartetto (No.1), mm.1–15)

The ending of Quartetto (No.1), thus, is solidifying the gestures heard in the first thirty-six measures. First, it redeems the doubling of pc(1) as the ending C♯4 is very clearly connected to the starting C4, unlike the weak C♯4 in m.36. With this redemption, Davidovsky’s conception of sameness comes to light fully: he has in fact tricked the circle of fifths, as the ending C♯4 is meant to sound as the starting C4.

Second, the weak sixth ic5-dyad heard in mm.35–36 (the F♯5 in the flute and the C♯4 in the strings) is now redeemed as well: in Example 3–7 below pc(6) is sustained in the viola in m.255, combined first with the ic5-dyad [2,7] as part of a triple-stop, and then transferred to the highest
note in the violin at the end of the measure (here it is also combined with a dyad, this time an ic1-dyad [2,3]) before resolving into the ending unison C#4.

Example 3–7. The redemption of the weak [1,6] dyad from mm.35–36 at the end of the piece (Quartetto (No.1), mm.255–257)

More importantly, this pc(6) is reinforced by an unfolding ic3-cycle: the [9,0] dyad in the cello in m.255, combined with pc(3) in the flute sets up pc(6), which actualizes this short embedded ic3P–A process. Figure 3–11 below maps the entire ending gesture onto the (01356) Tonnetz.
The [0,3,6,9] embedded ic₃-cycle moves diagonally toward pc(6) which resolves “down” (in the space) to the ending pc(1). Pc(8), achieved in mm.248–249 as the high G♯ shown in the previous Example 3–5, resolves “up” (in the space) to the same pc(1). The remaining notes of the localized aggregate are filled in by the force of the ic₅-cycle: the pitch-set [0,2,7] is completed by the triple stop in the violin in m.255, which then moves to a second triple stop, the ic₅-dyad, [5,10], and the “odd” note pc(4) (needed to complete this ending aggregate).

The asterisk shown with the flute’s high F in mm.255–256 (as shown in Example 3–7) signals an ossia marking not shown on the printed score. As seen below in the manuscript score,
this high F can also be played as a high D. The choice of pc(2) or pc(5) does not affect the aggregate completion, because both pitches have already been achieved through other means, but it does affect the intervallic symmetry in the approach to the full ensemble unison pc(1) by the instruments themselves. With pc(5), the flute approaches pc(1) from a perfect fourth above, mirroring the perfect fourth below in the cello’s pc(9) to pc(1) gesture. Notice also how the triple-stop in the violin is not present in the manuscript score, which only preserves [3,6] on the downbeat of m.256. In the printed score, the composer inserts pc(2) again so it also mirrors the semitonal gesture present in the cello’s pc(0) to pc(1).

Example 3–8. *Ossia marking in the manuscript score (Quartetto (No.1), mm.255–257)*

Figure 3–12 below summarizes the main ic₃P–A process in mm.1–36 and its connection to the ending. Pc(1), which signals the end of both halves of the ic₃P–A process in the first thirty-six measures, cues the axis of symmetry, and is the ending pitch of the work. Notice how the pairing of the first and last notes is shifted from this axis.
Figure 3–12. The pairing of \( pc(0) \) and \( pc(1) \) offsets the axis of symmetry of the \( \text{ic}_5 \text{P-A} \) process by a perfect fifth (Quartetto (No. 1), mm.1–36, and ending)

An attentive reader might have noticed that the full unison simultaneities in the piece up until now are recurrent, and never on the same pitch. Let us trace them, for they combine to create another contrapuntal line within Davidovsky’s *polyphony-of-space* texture. Figure 3–13 below maps the full ensemble unisons heard in these first thirty-six measures of Quartetto (No. 1) onto the \( \text{ic}_5 \text{-MOD}_{12} \) space.
The first full ensemble unison on A♭4 was achieved in m.12, as part of the gesture leading up to the third structural ic5-dyad that ended the first half of the ic5-P–A process (as shown in Example 3–1). The second full ensemble unison on D4 was heard in m.20, the “jump” within the ic5-cycle that was the starting point of the second half of the ic5-P–A process (as shown in Example 3–2). The third, on B3, was part of the fifth ic5-dyad in the middle of the second half of the ic5-P–A process, right before the weak return to pc(1) in m.32. These three unisons combine to create a [8,11,2] pitch-set, and are thus the start of ic3-P–A process. Its actuality would be pc(5), as shown in the figure above.

Notice in Figure 3–13 that the full ensemble unisons arrive around every ten measures (the second unison, on D4, comes in a bit early). It would seem that Davidovsky is carefully pacing
the steps of this $\text{ic}_3\text{P}–\text{A}$ process, and the analyst can perhaps thus expect the actuality event (pc(5)) to arrive at around m.42. Example 3–9 below shows these measures.

Example 3–9. The chromatic \((01234)\) pentachord occurring in the moment of the expected pc(5) that would actualize the $\text{ic}_3\text{P}–\text{A}$ process \((\text{Quartetto (No.1)}, \text{mm. 41–42})\)

The example shows the moment in which a chromatic \((01234)\) pentachord, pitch-set \([0,1,2,3,4]\), occurs on the downbeat of m.42. This moment is the first forte dynamic of the piece, and it is accentuated by a crescendo from niente in the string trio. Pc(0) is singled out in the flute with a slight 16th note delay, and with a sforzando–piano dynamic. The up and down bow markings, along with the precise dynamic manipulation suggest thorough control of this important moment by the composer. Pc(5) is expected here, as the telos of the $\text{ic}_3\text{P}–\text{A}$ process handled by the full ensemble unisons, yet instead we find an embedded $\text{ic}_1\text{P}–\text{A}$ process, from pc(0) to pc(4), which would also need a pc(5) to continue through an ascending $\text{ic}_1$-cycle. Figure 3–14 maps these two processes within the \((01356)\) Tonnetz.
Both processes are seeking the same pitch, though it would seem for disparate reasons: for the ic₃P–A process, pc(5) is its telos; for the ic₁P–A process, however, pc(5) is only a possible continuation. However, there is an added layer of complexity at work here that levels the efforts of both processes to achieve pc(5). Figure 3–15 below maps the first half of the main ic₅P–A process that started the piece onto the ic₅-MOD₁₂ space, and reinterprets this chromatic pentachord in m.42 as its M₅ transformation.

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25 The composer has a choice on how to continue an ic₁-cycle from the chromatic [0,1,2,3,4] pentachord: pc(5) and pc(11). Within a local aggregate, however, pc(11) has already been achieved, as it belongs to the ic₃P–A process handled by the full ensemble unisons.
Figure 3–15. M₅ transformation of the initial diatonic hexachord [8,10,0,1,3,5] into the chromatic pentachord [0,1,2,3,4] in m.42; pc(5) is missing to complete the transformation (Quartetto (No.1), mm.1–15, and 42)

Pc(5) is now not just the pitch needed for a possible ic₅P–A process continuation (and further actuality), but an actuality of the M₅ transformation of the first half of the main ic₅P–A process itself. Pc(1), which as we’ve seen previously is treated as an essential pitch in the piece, is missing its M₅ transformation partner.

To summarize: the ic₅P–A process, handled by the full ensemble unisons since the start of the piece, is searching for pc(5) in order for it to be actualized; in m.42, where this pc(5) could be expected, Davidovsky inserts the first chromatic verticality of the work, singled out by the use of the first forte dynamic; this (01234) pentachord is the M₅ transformation of the initial diatonic hexachord achieved through the first half of the main ic₅P–A process which began the work, although it is missing pc(5) in order for the transformation to be complete; it is also an
incomplete ic₁P–A process in itself, which needs pc(5) to continue into its actuality of becoming an ic₁-cycle.

Example 3–10. Pc(5) is finally achieved as a full ensemble unison in m.68, prepared by four incomplete unisons attacks on E₄, C₄, D♭₄ and D♯₄, and a chromatic [6,7,8,9] tetrachord

(Quartetto (No. 1), mm.63–70)
Example 3–10 shows the measures leading up to the full ensemble unison F6, pc(5), which finally occurs on the downbeat of m.68. In this moment, the processes described above reach their actuality, though there is more at play in this example. Four incomplete unison attacks starting on m.63 (marked double *sforzando*) occur before the unison F5: the E4 on m.63, the C4 and D♭4 on m.64, and D♯4 in m.65. In Figure 3–16 below the shaded pitch-classes within the ic₃-MOD₁₂ space represent these incomplete unisons. The resulting pitch-set [0,1,3,4] complements the ic₃P–A process handled by the full ensemble unisons within the aggregate. It does so, most importantly, while preserving the symmetrical pc(2)–pc(8) axis inherent in the ic₃P–A process itself. In this context, the search for pc(5) is intensified, as its arrival would also fulfill the symmetry potentiality of the entire collection.
Figure 3–16. The incomplete unison attacks, pitch-set [0,1,3,4], precisely filling in the aggregate initiated by the ic₃ₚ–ₐ process and establishing the axis of symmetry around pc(2) and pc(8) (Quartetto (No.1), mm.12, 20, 32, and 63–65)

Davidvosky’s polyphony-of-space counterpoint keeps building in complexity when in m.66 he introduces a second chromatic chord, the pitch-set [6,7,8,9]. Figure 3–17 below maps it within the ic₃-MOD₁₂ space, and interprets it as the M₅ transformation of the second half of the original ic₃ₚ–ₐ process that occurred from m.20 to m.36 of the piece.
Figure 3–17. M₅ transformation of the second diatonic hexachord [2,4,6,7,9,11] into the chromatic tetrachord [6,7,8,9] in m.66; pc(5) is missing to complete the transformation (Quartetto (No.1), mm.20–36, and 66)

When we combine the above Figure 3–17 with the previous Figure 3–15, we see that the M₅ transformation of the entire initial ic₅P–A process is almost complete. See Figure 3–18.
Both $M_5$ transformations (the chromatic chords) are missing $pc(5)$, the $M_5$ companion of the highly important $pc(1)$. The chromatic tetrachord in m.66 (before the full ensemble unison F5) is also missing $pc(10)$, perhaps another example of Davidovsky’s sympathy for rogue gestures. Surprisingly, $pc(10)$ is an ic5-related pitch to the expected F. This F is so thoroughly prepared that the composer might have felt the absence of $pc(10)$ as more interesting than its presence. Below is the list of processes that converge in this highly emphasized full ensemble unison $pc(5)$, and they are mapped within the Tonnetz in Figure 3–19.

1) The ic$_3$P–A process handled by the full ensemble unisons in mm.12,20 and 32

2) The symmetrical actuality resulting from the combination of the full ensemble unisons from mm.12, 20 and 32 with the incomplete unisons in mm.64–66 (leading up to the $pc(5)$ unison)
3) The M₅ transformation of the first half of the ic₅P–A process, represented by the chromatic pentachord in m.42 (where pc(5) was first expected).

4) The M₅ transformation of the second half of the ic₅P–A process, represented by the chromatic tetrachord in mm.66, one measure before the unison pc(5)

Figure 3–19. The four processes that converge on the full ensemble unison pc(5)

(Quartetto (No.1), mm.12,20,34, 42, 63–65, 66 and 68–70)

At the heart of the musical continuity in Quartetto (No.1) lies a complex network of contrapuntally woven lines of interval cycles. Their actualities, as we’ve seen with the full ensemble unison F6 in mm.68–70 and the ending pitch C♯4, become markers for the formal structure of the work. Let us look at a couple more examples of this technique.
§ 3.2 Quartetto No.3

Example 3–11 below shows the opening nine measures of Quartetto No.3. The initial tremolo A₄–C₅ ic₃-dyad in the piano’s right hand is transferred to the cello and viola on the last beat of m.4 (heard as sustained harmonics, gently prolonging the minor third sonority). At the end of m.4, the piano’s right hand moves to a second ic₃-dyad (D₅–B₄), heard as a dry attack on the D₅, and a long sustained B₄. The second minor third is descending, opposite the ascending tremolo gesture that started the piece.
Example 3–11. The first aggregate of the piece (Quartetto No.3, mm.1–9)
These two pairs of thirds combined result in the [9,11,0,2] pitch-set, member of the symmetrical (0235) set-class, which retains the ic\(_5\)-dyad [2,9] at its axis of symmetry. See Figure 3–20.

![Diagram of symmetrical tetrachord]

**Figure 3–20. Two ic\(_3\)-dyads in the piano’s right hand, [11,2] and [9,0], creating a (0235) symmetrical tetrachord (Quartetto No.3, mm.1–7)**

This first reading of the passage, which combines these two ic\(_3\)-dyads into a symmetrical tetrachord, is not the only possible reading. The two minor thirds can be interpreted as two independent ic\(_3\)-P–A processes in themselves. Process I, which starts with the [9,0] dyad in the piano’s right hand *tremolo* (and is then transferred and sustained by the violin and viola in mm.4–8), will seek the [3,6] dyad as its actuality in order to complete the ic\(_3\)-cycle, the pitch-set [0,3,6,9]. Process II, which starts with the piano’s right hand [11,2] dyad at the end of m.4 (the single attacks), will seek the [5,8] dyad as its actuality in order to complete its ic\(_3\)-cycle, pitch-set [2,5,8,11]. See Figure 3–21.
Both of these readings fulfill different temporal needs for the composer. The first reading, combining the initial minor thirds into the symmetrical (0235) tetrachord, will help complete a localized aggregate process occurring in the first nine measures of the work. The second reading, detaching the thirds into different ic₃-P–A processes, will help fuel the large-scale musical continuity of the entire piece. Let us now follow through the first reading, and return to the second later.

Davidovsky introduces a third ic₃-dyad in the piano’s right hand in mm.7–8: the high G7 and the low B♭1, extreme ranges connected with phrasing and beam markings. If we combine the three ic₃-dyads discussed thus far, they create the pitch-set [7,9,10,11,0,2], member of the all-combinatorial (023457) hexachord. See figure 3–22.
Figure 3–22. Three ic₃-dyads, [9,0], [11,2] and [7,10], creating an all-combinatorial (023457) hexachord, with an axis of symmetry around [2/7–1/8] (Quartetto No.3, mm.1–8)

Davidovsky now faces an important decision. He has completed the first half of the aggregate via a strict process (three ic₃-dyads, combined to create an ic₅-heavy symmetrical hexachord) and could either continue in the same manner (that is, completing the aggregate with the hexachord’s complement), or choose a completely different path. Based on what we’ve uncovered of his particular compositional technique, it is no surprise that he chose the latter.

As seen in Example 3–11 (shown again below), two instrumental forces are remaining to be introduced: the piano’s left hand, and the violin (remember, the viola and cello were prolonging the first ic₃-dyad [9,0] in mm.4–8).
Example 3–11. The first aggregate of the piece (*Quartetto No.3, mm.1–9*)
The piano’s left hand enters the work with a perfect fourth, the C♯4 attack at the end of m.4 is answered with a low, sustained G♯2. The violin answers this fifth with a fifth in m.6, the high F♯6 and lower B4 pair. Figure 3–23 adds these two ic5-dyads to the hexachord created by the ic3-dyads already discussed in the ic5-MOD12 space.

![Diagram](image)

**Figure 3–23.** Two ic5-dyads fill in the aggregate, [8,1] and [6,11], instead of a fourth ic3-dyad: pc(11) is doubled. *(Quartetto No.3, mm.1–7)*

These two ic5-dyads complement the aggregate process, except that pc(11) is doubled. The B4 was part of the second ic3-dyad in the piano’s right hand (mm.4–7), and it is also part of the violin’s ic5-dyad in m.6 (same range). Notice how it would have been easy for the composer to fill in the aggregate without this duplication by shifting the ic5-dyads one step counterclockwise within the ic5-MOD12 space (i.e., down a perfect fifth). The duplication, however, gives him an extra pitch to manage, as three pitches are now missing in order to complete the aggregate, the chromatic [3,4,5] pitch-set.
Notice in Example 3–11 how Davidovsky handles these pitches. The violin in mm.7–8 imitates the initial tremolo gesture, only this time with a whole step intervallic content. The E♭4 and F4 tremolo is meant to bring the listeners back to the start of the piece, yet the gesture has changed. This decision by the composer reminds us of the C4–C♯4 pairing from Quartetto (No.1) previously discussed in this chapter: there is a musical gesture that is restated with different pitch content. In the case of Quartetto (No.1), this gesture was a long sustained ensemble unison with very a particular dynamic, bow and articulation markings. In the case of Quartetto No.3, it is a highly metrically controlled tremolo, also with a particular dynamic marking. As seem in Example 3-11, the piano’s minor third becomes the violin’s major second. This ic₂-dyad is needed to advance the aggregate process, and its axis of symmetry cues the aggregate’s actuality, pc(4). See Figure 3–24 below. This Pc(4) is reached by the piano’s left hand in m.9. It is singled out with the particular timbre of the string pizz (played inside the piano).
Figure 3–24. The violin’s ic$_2$-dyad [3,5] advances the aggregate and points to the telos of the process, pc(4) (Quartetto No.3, mm.1–8)

This first reading of the introductory nine measures of the work is also interesting in regards to the aggregate segmentation: a symmetrical and all-combinatorial (023457) hexachord is created by the combination of the three ic$_3$-dyads; a symmetrical (0257) tetrachord is created by the two ic$_5$-dyads; and a symmetrical (012) trichord completed the aggregate process. This type of segmentation is only possible if one of the notes is duplicated, as $6 + 4 + 3$ equals 13, not 12.

As I mentioned earlier, there are large-scale consequences when we detach these intervallic ic$_3$-dyads from their immediate role in the localized aggregate process that starts the piece. In essence, this localized aggregate has been pieced together, so to speak, with three distinct elements: three ic$_3$P–A processes (which if actualized complete an aggregate of their own), an
ic₃P–A process (the two pairs of fifths), and an ic₁P–A process (the chromatic trichord that completed the aggregate). Let us focus on the ic₃P–A processes. Figure 3–25 shows the ic₃-dyads (Process I, II, and III) and their projected actualities.

Figure 3–25. Three ic₃-dyads, [9,0], [11,2] and [7,10], as part of three distinct ic₃P–A processes, and their projected actualities completing the aggregate

(Q uartetto No.3, mm.1–7)

These three ic₃P–A processes (originally introduced by the piano’s right hand in mm.1–7, shown in bold in the figure above) are transferred into the string trio for the first time in m.21, as seen in Example 3–12 below. The tremolo gesture returns in all three instruments, a very salient surface element that helps the listeners tie these large-scale processes together. Process I is now in the violin and adds a D♯4, pc(3), to its cycle. It is now searching for pc(6) in order to be actualized (notice that the tremolo here is on the ic₆-dyad [3,9]). Process II is in the viola, and
adds the F3, pc(5), in its cycle and is now searching for pc(8) in order for it to be actualized (the 
tremolo is on the [2,5] dyad). Process III reaches actuality here, as the cello presents the two 
needed pitches to complete its (0369) tetrachord, the [1,4] dyad. Notice how all three processes 
are heard together, overlapping for the first time in the piece, yet all rhythmically independent of 
each other with slightly different tremolo speeds in the polyphony-of-space counterpoint.

Example 3–12. The three distinct ic3P–A processes advancing at different speeds through 
the musical continuity (Quartetto No.3, mm.21–22)
At the end of m.23, the piano’s left hand initiates Process II once again by reintroducing the original [11,2] dyad. We will talk about the idea of process re-initiation shortly.

Example 3–13 below shows mm.29–37. The [1,4] dyad that actualized Process III in mm.21–22 in the cello (shown in the previous example) is now heard in the viola in m.29. It is also transferred, up an octave, to the violin in mm.31–32. This is the only ic3P–A process actualized thus far, and all the members of the string trio have addressed its telos, the [1,4] dyad. Notice, once again, the different measured tremolo gesture in each of the voices.
Example 3–13. *Process III*, actualized in the previous Example 3–12 by the cello, is now transferred to the remaining voices of the string trio. *Process II* reaches actuality with the [5,8] dyad (*Quartetto No.3*, mm.29–38)
The example also shows the moment of actuality of Process II. The viola in mm.36–37 has a *tremolo* over the F5 and A♭5, the needed [5,8] ic3-dyad to complement its original [11,2] dyad. I mentioned earlier (Example 3–12) that Process II was re-initiated by the piano’s left hand in m.23. This is the process being actualized here, and it would seem as if Davidovsky is careful to remind the listeners (analysts, the processes themselves) where they stand before reaching a structural event. What is interesting about this particular actuality is that it wilts away in the following measure. The F5–A♭5 *tremolo* inverts around the A♭5, respelling the pc(8) as a G♯, and gives way to a G♯5–B5 dyad before turning into the major third D5–G♭5 *tremolo* that ends the gesture. This wilting of the ic3P–A process’s actuality is emphasized by the use of *glissandos*. The technique of providing weak actualities in self-perpetuating ic3P–A processes does not seem surprising, as it injects the processes with a continuous feeling of incompleteness, and thus necessity to restart. This self-perpetuation is essential to the understanding of Davidovsky’s musical continuity. Up until now we’ve seen examples of processes that are directed toward their particular telos. That is, the force behind the potentiality–actuality type of motion (e.g., the full ensemble unison pc(5) in m.66 of *Quartetto (No.1)* described previously in this chapter). In *Quartetto No.3* we see an evolution of this technique: shorter processes constantly regenerate, even after reaching completeness.

Example 3–14 below shows mm.59–60. The *tremolo* returns, and the processes resurface. So far their actualities have been achieved in reverse order of their introduction in the piano’s right hand in the opening measures: Process III (introduced last in mm.7–8) was actualized first, then Process II, and now it is time for Process I. Figure 3–26 summarizes their progress thus far within the *Tonnetz*. 
Figure 3–26. The three distinct ic₃P–A processes reaching their actualities in different moments throughout the piece. Process I is still incomplete, as it is missing pc(6). The same pc(6) will also complete the large-scale aggregate (Quartetto No.3, mm.1–37).

Figure 3–26 above summarizes where the processes stand before Example 3–14. Processes III and II (in that order) have been actualized. It is in m.59 when Process I reaches its actuality. This moment is important. As shown in Example 3-14, under the violin’s E♭5–F♯5 tremolo, the already actualized Processes II and III restart with their original ic₃-dyads, [11,2] and [7,10] respectively.
Example 3–14. Process I reaching actuality, and at the same time Process II and III restart (Quartetto No.3, mm.59–60)

I’ve only shown three instances where these processes return in the piece after their initial presentation. There are many more. The purpose of such examples is to demonstrate how the icP–A processes can shape short term and long term formal structures, as they can endlessly flow in Davidovsky’s polyphony-of-space.
CONCLUSIONS

When describing Davidovsky’s musical continuity I borrowed two terms from Aristotle’s physics of motion: *entelechia* and *enèrgeia*. In the original meaning both refer to forces that shape change. *Entelechia* is an internal force inherent in all changing things, while *enèrgeia* is an external force capable of allowing or impeding a changing thing from actuality becoming what it is meant to become. I used both of these terms as metaphors for the music at hand because they proved very useful in describing a kind of music stripped from tonal function that yet seems to have a very clear direction. The compositional method employed by Davidovsky is indeed filled with intention: there is a very precise pre-compositional methodology, rooted in the cyclical and symmetrical conception of the aggregate. In my opinion this precise technical process is what provides the energy and spark in Davidovsky’s music—its soul, if you will.

When speaking of souls of musical compositions, we find ourselves in a different philosophical world, that of Adorno. Ultimately, I do see my discussion on Davidovsky’s technical process as subsidiary to Adorno’s *Wahrheitsgehalt*.

Kofi Agawu highlights in his article “How we got out of analysis, and how to get back in again” what I find to be an essential feature of analysis: it is “ideally permanently open, […] dynamic and on-going […].” 26 What I find valuable in this perspective is that it promotes discovery, and what I am particularly interested in (and what Agawu argues to be one of the two main benefits of analysis) is the type of discovery that leads to Adorno’s *Wahrheitsgehalt*, the composition’s “truth content.” A centerpiece of Adorno’s aesthetic theory, the “truth content” is that which lies beyond the factual level of music, achievable only through a dialectical, disclosive and nonpropositional critique. For Adorno, each work of art has a *Gehalt* fueled by a

dialectic between the *Inhalt* (content) and *Form* (form). If the analyst fails to grasp the complex internal dynamics of the artwork, it will remain misinterpreted. For Agawu, these complex internal dynamics are the *technique-structure* of the music, and it is through its discovery that an analyst can hope to uncover the *Wahrheitsgehalt*. I am not suggesting (nor does Agawu) that only uncovering the technique-structure of a composition will reveal its truth content, but understanding the complex technicalities of the work will indeed provide the analyst the means to potentially reach it. Throughout this dissertation I have defined Davidovsky’s *technique-structure* as the internal dynamics of his pitch structures in relationship to musical continuity and the formal structure, the potentiality–actuality processes that shape his Quartettos.

I conclude this dissertation with Adorno (through Agawu) because the task at hand, analyzing the music of Mario Davidovsky, has proven a challenge for the few theorists and composers who have attempted it. I am not stating that I have been any more successful than my predecessors, only that I began the journey with the *Wahrheitsgehalt* in mind. This led me, inevitably and necessarily, to address the technique-structure of Davidovsky’s music.

There is an important clarification to made be here: for Adorno, the *Wahrheitsgehalt* of an artwork is essentially bound to that particular artwork. Its internal dynamics are specifically the means to reach its own truth content. Yet uncovering the *Wahrheitsgehalt* of specific works has not been the sole purpose of this dissertation, for I have taken leeway with the term technique-structure to uncover a more generalized, methodological approach in Davidovsky’s overall compositional style. It is precisely this type of journey that hasn’t been thoroughly explored in previous ventures into his music.

The few analytical and theoretical responses to Davidovsky’s music are heavily tilted toward the first application of the *polyphony-of-space* metaphor mentioned in Chapter One,
concerned with dialectic forces between instrumental lines and a narrative approach of phraseology and gesture. This tendency most likely commenced in the late sixties when Davidovsky’s electroacoustic music was the basis for his Pulitzer Prize. The only two publications in major American journals are from this decade: Wourinen (1966) and Gryc (1978). The Wuorinen article is a brief analysis on the dialectic forces between the orchestra and tape in *Contrastes No.1*, while Gryc’s analysis applies Edward Cone’s theory of stratification to *Synchronisms No.6*.

When the composer moved away from the studio, his acoustic music received the same type of scholarly study, although no other analysis was published until McCreless (2006), in the form of a chapter in the book “Approaches to meaning in music” which, as inferred from its title (*Anatomy of a Gesture: From Davidovsky to Chopin and Back*) follows a similar analytical approach as the previous two publications. To my knowledge, these are the only three published English articles on Davidovsky’s music to date.

The rest of the scholarly work has been done behind the doors of universities in which Davidovsky is still recognized as a major American post-modernist. The tendency in these dissertations is the same. The more relevant analytical dissertations have followed a gestural and/or phraseology approach: Malloy’s (1998) study in cadential procedures in *Divertimento*, Ricks’ (2001) analysis of formal structural pairings in *Quartetto*; and Rust’s (2007) narrative approach to the phraseology of *Quartetto* are at the head of this tendency.

The generalized and methodological approach that I believe to have uncovered (what I called Davidovsky’s compositional method in Chapter One) is rooted in the asymmetry/symmetry transformations and the self-perpetuation of interval cycles. These two processes, thoroughly discussed in Chapters Two and Three, shape the musical continuity and
formal design of the Quartettos, and I presume other works. What lies ahead is the application of
the discoveries made in these chapters to the rest of Davidovsky’s body of work. The Quartetto
series spans from 1987 to 2005, a wide enough time range to assume that interval cycle and
symmetrical processes have been ever-present in his music—yet this is an assumption, not a fact.
The potential for future research is exciting.

Beyond Davidovsky, there is a second large project to be abstracted from Chapter Two,
that of the concept of near-symmetry. The idea that we can measure different levels of
asymmetry can be a useful tool when analyzing the music of composers of the Second Viennese
School, just to name obvious candidates. The theoretical idea itself is raw and should be
expanded as well. For example, I’ve only explored the trichords and tetrachords from the
perspective of $N-S_{n+1}$, yet there are many more discoveries to be made once we allow ourselves
to add more than one pitch to an asymmetrical collection.
BIBLIOGRAPHY


