

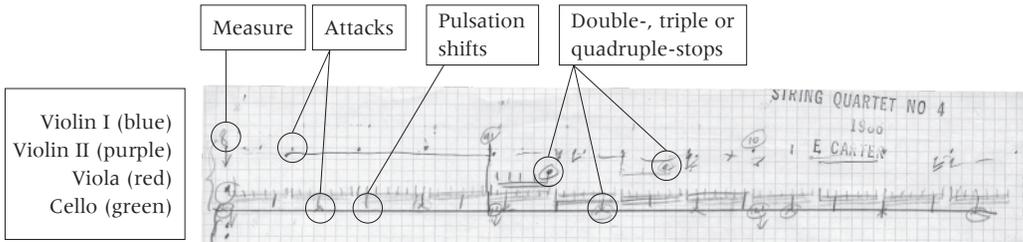
Rhythmic Process in Elliott Carter's Fourth String Quartet

by Laura Emmerly

In his compositions of the 1980s, Elliott Carter focused on developing rhythmic expression.¹ He reached the apex with his Fourth String Quartet (1986), in which rhythm is not only the most complex element, but the primary conceptual idea. Sketches for the Fourth Quartet tell of Carter's new approach to composing; he meticulously devised an intricate rhythmic plan for the entire quartet individually, one section at a time, before adding other components.²

An analysis of these sketches reveals a logical hierarchy in the rhythmic process: after outlining the quartet's general structure, Carter uses dots to map distinct characteristic rhythmic ostinati for each instrument. By superimposing the underlying pulsations of each part, he marks points of polyrhythmic alignment and forms a higher-level composite rhythmic structure. Lastly, within a small subset of measures, Carter transforms this dot-notation into elaborate rhythmic figures that fit within the previously established framework of aligned pulses. He repeats these stages for each section of the piece.

Carter calculates the precise polyrhythmic details of the four instruments – their tempi, ratios, rhythmic relations, motives, and cycles. He assigns a distinct speed to each part, creating a structural polyrhythm of 120:126:175:98 that runs from the beginning to the end of the piece. This polyrhythm results in rhythmic relations of 8:6:5:7. Thus, the first violin is rhythmically characterized by thirty-second notes, the second violin by sixteenth-note triplets, the viola by quintuplets, and the cello by septuplets. The specific beat divisions are thoroughly planned on every page of the rhythmic sketches. At first, these polyrhythmic figures appear repetitive and unnecessary. However, a close inspection reveals important variations within each figure: Carter calculates attack points within each rhythmic group, their partial or full coincidences (moments at which pulsations from two, three, or all four instruments coincide), and the length of cycles (time between coincidence points), so that only one attack from an instrument will be heard at a time.



Example 1: Elliott Carter, String Quartet No. 4, mm. 8–10: Polyrhythmic Graph (excerpt) (Elliott Carter Collection).

Carter first sketches the rhythmic details for the cello (*Example 1*). Pulsation shifts, as they traverse a cycle, are marked with an extended downward stem. The longest stem in a grouping, marked with an “x”, denotes attack points – the pulses that sound versus those that contain rests or carry a tie from the previous beat(s). When Carter adds the remaining three instruments, he uses dots to indicate their attack points. A circled dot marks either a double, triple, or quadruple stop. Each instrument’s part, with its rhythmic figuration, is color-coded, with blue pencil for the first violin, purple for the second violin, red for the viola, and green for the cello.

With so many variables represented within the rhythmic structure, it becomes clear why a detailed breakdown of each measure is needed. With four instruments playing at differing speeds that yield a particular rhythmic ratio, different cycle durations, and carefully placed points of attack, each measure requires specific calculations. Taken together, all criteria call for the repetitive, yet uniquely distinctive 8:6:5:7 polyrhythmic alignment. The complexity of this design is further increased by the addition of frequent meter changes and twenty-six metric modulations.

The long-range polyrhythmic sketch lays out a general rhythmic design that guides both the large-scale and local rhythmic events (*Example 2*).³ The graph contains four horizontal lines, one for each instrument. The instruments are not stacked in order: rather, the cello is on top, followed by the second violin, then the first violin, and finally the viola on the bottom. Such ordering reflects the durations of periods between attacks in each instrument: the longest spans are in the cello, four measures apart, progressively decreasing to the shortest ones in the viola, which occur every other measure. Each line’s use of color and rhythmic ostinato is consistent with the established color scheme: blue (violin 1), purple (violin 2), red (viola), and green (cello). Each measure outlines a general rhythmic event: the characteristic rhythmic pattern associated with each instrument, the beats on which these rhythmic events occur, and the placement of sounding pulsations designated by dots. From this general layout, Carter “zooms in” onto a small section of several measures and gradually adds details.

The image shows a musical score excerpt with four staves. The staves are labeled on the right as Cello (green), Violin II (purple), Violin I (blue), and Viola (red). The score contains rhythmic markings, including dots, double, triple, and quadruple stops, and extended stems. The measures are numbered from 61 to 85.

Example 2: Elliott Carter, String Quartet No. 4, Long-Range Polyrhythms, page 1 (excerpt) (Elliott Carter Collection).

Focusing on sketch material for mm. 76–79 (score mm. 93–97), we can see how the stages of Carter’s compositional process unfold. In the first of these phases, the rhythmic layout is still general and resembles the long-range polyrhythmic graph with slightly increased rhythmic activity: Carter fills in several more beats with the instruments’ distinctive 8:6:5:7 patterns, showing how polyrhythms for two or three parts may occur simultaneously. This superimposition reveals points of polyrhythmic alignment, and forms a higher-level composite rhythmic structure. Next, Carter develops rhythmic ostinati individually for the cello, viola, and second violin, before joining them in one graph; their points of attack are notated by dots, double, triple, or quadruple stops by circled note-heads, and shifts in cycles by extended stems (*Example 3*). Calculations on the page, colored according to the previously established system, indicate the number of pulses and the length of a cycle for each instrument. The polyrhythmic stacking of these three instruments is sketched several more times, each time with additional detail.

Once Carter fully exploits the possibilities of this generally-constructed rhythmic outline, he writes the specific rhythmic variations. Usually, he starts with the first violin, the instrument that was missing in earlier stages, and then gradually adds other parts. Underneath the violin part, Carter sparingly adds general rhythmic figurations from the other three instruments: the second violin’s triplets, the viola’s quintuplets, and the cello’s septuplet downbeats. The exact rhythms of the other instruments are included in the next stage. The added parts show not only their rhythmic grouping and attacks, but also rests, polyrhythmic alignment, subdivisions of the beat, and the beginnings and endings of their cycles. In the last stages of the rhythmic sketches, Carter translates the instruments’ basic rhythmic configurations into precise durations as they appear in the published score, complete with beat count (*Example 4*). When the finest rhythmic details for each section are completed, he starts the process anew for the next set of measures.

The rhythmic sketches are accompanied by numerous pages containing fractions, ratios, basic arithmetic calculations, and linear and second-degree polynomial equations. These are methodical calculations of beat durations, beat totals, the number of beats between each cycle, and their values as they metamorphose through numerous meter changes and metric modu-

Violin II (purple)
Viola (red)
Cello (green)

76 761 771 781

STRING QUARTET NO. 4
E. CARTER
1936

Violin II pulse calculations (purple)
Viola pulse calculations (red)
Cello pulse calculations (green)

Violin II pulse calculations (purple):
 $\frac{420}{2} = 210$
 $\frac{820}{4} = 205$
 $\frac{420}{8} = 52.5$
 $\frac{420}{7} = 60$
 $\frac{9}{5} = 75.6$
 $\frac{9}{7} = 54$
 $\frac{9}{2} = 18$
 $\frac{7}{5} = 142 = 58.8$
 $\frac{7}{3} \times 42 = 98$
 $\frac{7}{15} \times 42 = 19.6$
 $\frac{7}{15} \times 84 = 39.2$
 $\frac{7}{5} = 117.6$
 $\frac{7}{4} = 19.6$

Viola pulse calculations (red):
 $756 = 12 \times 9$
 $1176 = 28 \times 14$
 $756 = 12 \times 1176 = 18.6$
 19.6
 34.2
 62.5
 54
 58.8
 60
 75.6
 98
 105
 117.6
 189
 196
 210

Cello pulse calculations (green):
 19.6
 34.2
 62.5
 54
 58.8
 60
 75.6
 98
 105
 117.6
 189
 196
 210

Example 3: Elliott Carter, String Quartet No. 4, Rhythmic Detail: Second Violin, Viola, Cello, mm. 76–79 (Elliott Carter Collection).

lations. For instance, in the previous example, Carter writes the pulse values under each note, and then adds the totals to obtain the precise pulse duration of a sustained sound. On the bottom right-hand side of the page, he assigns a pulsation value to each note: a thirty-second note equals three pulses, a sixteenth note of a triplet equals four, a sixteenth note equals six, etc. These calculations of pulse totals are necessary to ensure that pulsation shifts adhere to the established pattern of rotation, and that all four instruments will not have simultaneous attacks.

In the three decades he spent searching for ways to restructure rhythm, Carter reached a pinnacle of rhythmic complexity with his Fourth String Quartet. He expanded his rhythmic expression without lessening other musical elements; harmony, counterpoint, and form carry equal importance. With all these processes sketched as individual figurations, which are then fragmented and repeated, Carter demonstrated a new approach to composing. This process displays the composer's keen ability to think abstractly – to create a final product from scattered dots, numbers, and configurations on the page.

Measures
Violin I
Pulse
durations
Pulse
totals

DEC 20 1985

Pulse values scale

Example 4: Elliott Carter, String Quartet No. 4, Rhythm Detail and Pulse Count, mm. 91–96 (Elliott Carter Collection).

¹ During the 1980s, Carter's rhythmic practice underwent fundamental changes characterized most notably by long-range polyrhythms. This emphasis on the rhythmic process is evident in *Night Fantasies* (1978–80), *Triple Duo* (1982–83), *Esprit Rude/Esprit Doux* (1984), *Penthode* (1984–85), the *Oboe Concerto* (1986–87), and *Enchanted Preludes* (1987–88). See John F. Link, *Long-range Polyrythms in Elliott Carter's Recent Music*, PhD diss., University of New York (Ann Arbor: UMI, 1994).

² For further sketch studies pertaining to Carter's Fourth String Quartet, see Jonathan Bernard, "The Evolution of Elliott Carter's Rhythmic Practice," *Perspectives of New Music* 26 (1988), no. 2, pp. 164–203; David Schiff, *The Music of Elliott Carter*, new edn. (London: Faber and Faber, 1998); Schiff, "Elliott Carter's Harvest Home," *Tempo* (December 1988), pp. 2–13.

³ Link, *Long-range Polyrythms* (see note 1), pp. 49–56.