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Symmetry in Morton Feldman's *Coptic Light* and Pierre Boulez's *Rituel*

In 1965 Morton Feldman wrote, "If anyone negates my music, it is, say, Boulez,"¹ and a year later still insisted: "[Boulez] is everything I don't want art to be."² Yet by 1981 Feldman had seemingly changed his mind, asserting in a lecture, "There's no difference between me and Boulez, no difference!"³ In the same lecture Feldman praises Boulez's ear for being the cause of Boulez's "success."⁴

Did Feldman's opinion of Boulez significantly evolve over time, or is there a way for both views to be true at the same time? That is, does a lens exist through which Feldman and Boulez could appear simultaneously opposite and similar?

This question may be answered in part by comparing Feldman's use of symmetry in his *Coptic Light* (1986) with Boulez's in his *Rituel in memoriam Bruno Maderna* (1974–75, revised 1987). These two works, both orchestral and around 30 minutes in length, sound at least

¹Feldman, Morton, "The Anxiety of Art," in *Give my Regards to Eighth Street: Collected Writings of Morton Feldman*, ed. B.H. Friedman (Cambridge: Exact Change, 2000), 29.

² Feldman, Morton, "Predeterminate/Indeterminate," in *Give my Regards to Eighth Street: Collected Writings of Morton Feldman*, ed. B.H. Friedman (Cambridge: Exact Change, 2000), 33.

³ Feldman, Morton, "Twelve tone technique in Varèse's Déserts, lecture given at California Institute of the Arts (CalArts) in February 1981," transcript, accessed October 27, 2016, www.cnvill.net/mfdeserts.pdf.

⁴ Ibid.

superficially different on first listening because of the disparity between their harmonic languages and styles of instrumental writing. Yet both works are similar with respect to their next most obvious quality: their static, repetitive natures; a quality owing, in part, to both works' incorporation of symmetry at various musical levels.

As 20th century composers increasingly abandoned old methods of formal organization based in tonality and sought new procedures to govern musical structure, many turned to symmetry as an organizational principle. Hindemith structured his miniature opera *Hin und zurück* as both a dramatic and musical palindrome, Messiaen developed his modes of limited transposition and non-retrogradeable rhythms, Berg and Webern constructed many of their tone rows from hexachords related by retrograde inversion, and Stravinsky and Bartók permeated their music with the octatonic collection whose patterns divide the octave into sections of equal size. However, as often as symmetry is passingly referenced in the description of 20th century compositional devices, little has been exclusively written to define musical symmetry. In the interest of a more systematic comparison between the works this paper examines, I propose four categories of musical symmetry, which are based on definitions of the term by dictionaries, mathematicians, and musical theorists.

The first type of symmetry found in music is reflection. In his article "What Is Symmetry in Music?" theorist Davorin Kempf defines two types of musical symmetry, both of which can be considered subcategories of the Oxford English Dictionary's definition of "symmetry" as "equable distribution of parts about a dividing line or centre."⁵ Kempf's first type is the

⁵ Oxford English Dictionary Online, s.v. "symmetry," <http://www.oed.com.proxy3.library.mcgill.ca/>.

palindromic “arrangement of formal parts” such as that which might occur in a da capo aria or a classical rondo,⁶ and the second is “mirror symmetry,” which we experience when “in the course of musical time, after the imagined vertical axis, we are listening to the retrograde version of the music that we have just heard in its original version,” as in Machaut’s *Ma fin est mon commencement*.⁷ An important distinction between these two types of reflective symmetry is that in the first type, the palindromic arrangement of formal parts, the formal parts may be themselves asymmetrical. This first type need not apply only at the large scale—it could also describe a palindromic arrangement of asymmetrical phrases inside a single section or even a palindromic arrangement of asymmetrical motivic gestures within a phrase. Likewise, “mirror symmetry” could also be used to describe smaller elements, such as a phrase whose second half is a retrograde of the first half, a mode of palindromic intervals,⁸ or Messiaen’s non-retrogradable rhythms. It is important to note that in most cases “there are small or strong violations of symmetry”⁹ (recapitulations are rarely exact) and that “mirror symmetry” could also occur around a horizontal axis (to create a symmetrical harmony).

Although symmetry is commonly understood as only referring to reflection about a central axis, symmetry’s mathematical definition is more nuanced. Mathematician Donald W. Crowe says that symmetry’s “defining property” is that it is “a distance-preserving

⁶ Such as an ABA form in the case of the aria, or ABACABA, etc., in the case of the rondo, where letters represent formal sections.

⁷ Davorin Kempf, “What is Symmetry in Music?” *International Review of the Aesthetics and Sociology of Music* 27, no. 2 (December 1996): 156. Accessed December 13, 2016. <http://www.jstor.org/stable/3108344>.

⁸ For example, the pattern of half-steps in the dorian mode: 2 1 2 2 2 1 2.

⁹ Kempf, “What is Symmetry in Music?” 157.

transformation of the plane onto itself” and thus includes translation and rotation in addition to reflection.¹⁰

Mathematically, translation occurs when a plane is moved by a vector to be some distance away from the original plane, while remaining parallel to the original plane.¹¹

Translational symmetry, also known as periodicity or planar symmetry, occurs through “infinite repetition of the same motif.”¹² The musical parallel could occur at various levels: in Chopin’s *Berceuse*, for instance, the same melody repeats approximately every four bars (with elaboration, but not harmonic contrast) while the left hand figure repeats every measure. Translational symmetry accounts for the octatonic scale’s frequent designation as symmetrical¹³ despite its intervallic series having no palindromic center, only a repeating pattern.

Rotational symmetry occurs when a plane is rotated about a given point within the plane.¹⁴ Musically, we might think of rotation occurring when an idea is repeated with one parameter changed in relation to another parameter. For instance, a triad repeated in different inversions could be described as a rotation of pitches over vertical pitch space, or medieval isorhythms could be understood as a rotation of rhythm over a melodic line.

¹⁰ Donald W. Crowe, “Symmetries of Culture,” (paper presented at the Bridges: Mathematical Connections in Art, Music, and Science annual conference, Winfield, Kansas, July 27–29, 2001), <http://archive.bridgesmathart.org/2001/bridges2001-1.pdf>, 3.

¹¹ Ibid.

¹² Magdolna, Hargittai and István Hargittai, *Visual Symmetry*, (Singapore: World Scientific Publishing Co. Pte. Ltd., 2009), accessed December 15, 2016, <http://www.worldscientific.com.proxy3.library.mcgill.ca/worldscibooks/10.1142/7042#t=toC>, 119.

¹³ Charles Wilson, “Octatonic,” *Grove Music Online*, *Oxford Music Online*, Oxford University Press, accessed December 15, 2016, <http://www.oxfordmusiconline.com.proxy3.library.mcgill.ca/subscriber/article/grove/music/50590>.

¹⁴ Crowe, “Symmetries of Culture,” 3.

The last definition of symmetry pertinent to musical discussion is artistic, rather than technical: balance. The Oxford English Dictionary includes a broad definition of symmetry as being “the condition or quality of being well-proportioned or well-balanced.”¹⁵ In his essay “Crippled Symmetry,” Feldman describes the symmetry in Anatolian rugs as “never mechanical, as I had expected, but idiomatically drawn.”¹⁶ Although one of these rugs might have a border with 13 motifs on one side and 14 on the other, or a repeating motif might change slightly in shape with each repetition, the rug still appears symmetrical at first glance because its proportion and balance are undisturbed.

Feldman explains in the preface to *Coptic Light* how the ability of Coptic textiles to “convey[] an essential atmosphere of their civilization” inspired him to consider what “aspects of music since Monteverdi” might convey the “instrumental imagery of Western music.”¹⁷ The word “imagery” is significant; Feldman’s use of symmetry, which is primarily apparent in affect, testifies to decision making guided by experiential senses.

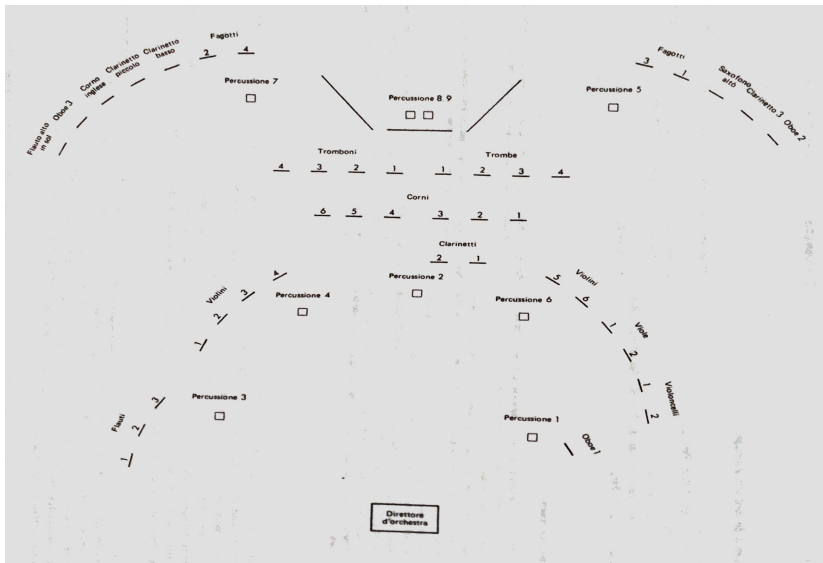
Upon initial investigation this usage seems to contrast with the way Boulez uses symmetry in *Rituel* as a more “cerebral” organizational principle, guiding the extra-compositional abstraction of the ensemble’s quasi-mirror symmetrical arrangement layout on stage (example 1) as well as delineating a highly sectionalized structure.

¹⁵ Oxford English Dictionary Online, s.v. “symmetry.”

¹⁶ Feldman, Morton, “*Crippled Symmetry*,” in *Give my Regards to Eighth Street: Collected Writings of Morton Feldman*, ed. B.H. Friedman (Cambridge: Exact Change, 2000), 134.

¹⁷ Morton Feldman, *Coptic Light*, (London: Universal Edition, 1986).

Example 1 Boulez, *Rituel in memoriam Bruno Maderna*, stage setup¹⁸



Boulez divides the work into fifteen sections with odd numbered sections marked *très lent* and even numbered sections marked *modéré*. These sections are further contrasted via texture (heterophony characterizes the *modéré* sections while the *très lent* sections are more chordal) and instrumentation (the ensemble is divided into eight groups, and group VIII, which contains all the brass instruments, plays throughout every odd numbered section but never the even numbered sections). On paper, these sections form a palindrome of alternating contrasts. However, when experienced in musical time, the final section spans nearly half the piece's total duration. Although this imbalance might preclude experiencing the structure as a palindrome, the recurring sections still create a periodicity that Boulez describes as “perpetual alternation.”¹⁹

Coptic Light refuses sectional division. The instrumental voices move from pattern to pattern unsynchronized from one another so that the texture morphs almost imperceptibly over long spans of time. In the opening the violins and flutes oscillate hesitatingly between E and A, a

¹⁸ Pierre Boulez, *Rituel in memoriam bruno maderna* (London: Universal Edition, 1993).

¹⁹ Ibid.

motion made prominent to the ear by its high register and its presence for the first thirty-three measures, after which it begins a forty-measure dispersal process. Approximately seventy measures before the end, the same pitches return in the violins, this time oscillating rhythmically with forward drive. It could be argued this moment is a recapitulation, an obvious sectional division. If so, the piece would exhibit a quasi-palindrome at the formal level: ABA'. Yet the first "A" fades so gradually to what we might call the "B," and the return is so unprepared (with no preceding *ritardando* or cadence) a first-time listener might not recognize the moment as structurally significant. Regardless of whether the piece is perceived as a formal palindrome with a recapitulation, or simply a morphing wash of sound, the moment still provides a sense of balance and cyclicity.

Boulez employs another large-scale reflective symmetry in its bell-shaped orchestrational arch. The first *très lent* section uses only one of the ensemble's eight groups, the second uses two, etc., increasing with only one exception until all groups are employed in the penultimate *très lent*. In the final section, all groups begin together and gradually exit in the opposite order of their arrival until the piece ends with only groups VII and VIII (example 2).

Example 2 Jonathan Goldman, instrumental groups used in *très lent* sections.²⁰

		Response rehearsal no.						Coda							
		1	3	5	7	9	11	13	A	B	C	D	E	F	G
Instrumental groups	I		•	•	•	•	•	•	•						
	II			•	•	•	•	•	•	•					
	III			•	•		•	•	•	•	•				
	IV				•		•	•	•	•	•	•			
	V						•	•	•	•	•	•	•		
	VI						•	•	•	•	•	•	•	•	
	VII							•	•	•	•	•	•	•	•
	VIII	•	•	•	•	•	•	•	•	•	•	•	•	•	•

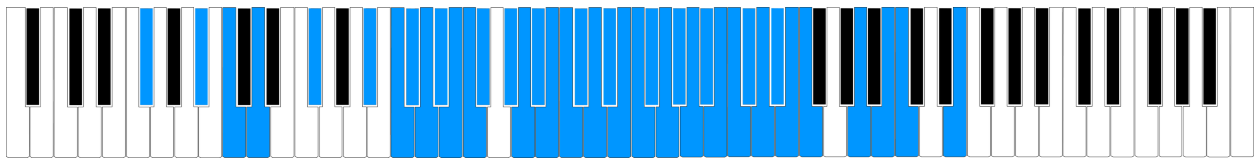
²⁰ Jonathan Goldman, *The Musical Language of Pierre Boulez: Writings and Compositions* (New York: Cambridge University Press, 2011), 111.

Feldman creates balance through density in a different way: by keeping the number of instruments and their registers almost completely constant. With the exception of the tuba, which is tacit for approximately the last one hundred bars, no instrument rests for more than a few measures. The consistency of the density and the vertical space as well as the lack of hierarchy by any single voice creates a directionless effect very much akin to that of a patterned rug.

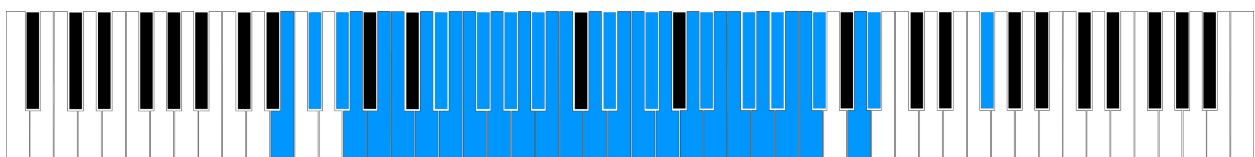
The pitch content in the Feldman is also non-hierarchical. The concurrence of a few instrument's melodic patterns might momentarily bring certain notes to prominence, but there is never a single chord presented by all the voices in any traditional sense. When reducing all the notes of the initial and final patterns to the keyboard (example 3), the harmonic content is revealed to be a nearly unbroken massive tone cluster, quasi-symmetrical in its spacing (with a dense mid-range and looser low- and high-ranges). Although no tonal center can be identified throughout the piece, it seems significant that the outer notes in the first harmony, F # and E (spelling up from the bass), are a reflection of the outer notes in the last harmony, E and F #.

Example 3 Reduction of pitches (shown in blue) in *Coptic Light*

(a) first measures



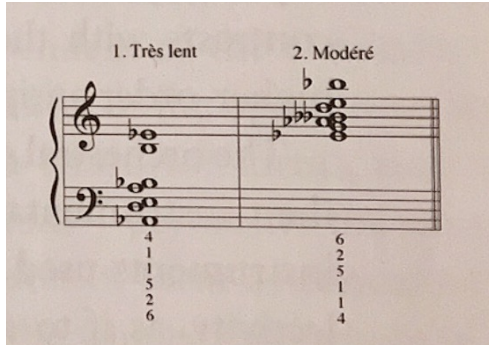
(b) final measures



Boulez uses literal mirror symmetry to obtain the pitch collection for the seven melodic gestures around which the entirety of *Rituel* is based. The E \flat at the top of the chord in section I

(example 5) becomes a horizontal axis around which all the lower pitches are reflected. The resultant pitches (example 4) become pitch material for section II (example 5).

Example 4 Goldman, reduction of pitches in first *très lent* and *modéré* sections²¹



Example 5 Boulez, *Rituel*, section I and section II

The oboe's seven gestures in the *modéré* repeat throughout the piece via rotational symmetry. As seen in example 5, the first section contains one chord. Each subsequent *très lent* section adds a chord until a series of seven chords is reached in section XIII. The highest voice in each chord plays one of the seven

gestures from the first *modéré* section, the voices underneath imitating the gesture at a variety of

²¹ Goldman, *The Musical Language of Pierre Boulez*, 113.

transpositional levels. If the gestures are labeled 1–7 in the order they are presented in the first *modéré* section, the gestures form the pattern shown in table 1.²²

Table 1 Rotating pattern of gestures in *Rituel*'s odd-numbered sections

Section	Gesture in highest voice
I	(5)
III	7 (5)
V	4 7 (5)
VII	2 4 7 (5)
IX	6 2 4 7 (5)
XI	3 6 2 4 7 (5)
XIII	1 3 6 2 4 7 (5)

Mirroring this growing pattern in the piece's first half, section XV occurs over seven sections labeled A–G in the score, the first of which contains seven chords with each subsequent section decreasing by a chord until the final section contains a single chord.

While the *modéré* sections are each made up of seven section based on the seven gestures, their pitch content and ordering isn't as strict as that found in the *très lent* passages. In these sections, Boulez allows the conductor to choose the groups' moments of entrance, allowing for possibilities of further distortion. Although there is not a strict symmetry governing these passages, the proliferation of many similar horizontal gestures creates a planar symmetry similar to Feldman's.

Within each of the first seven *très lent* sections (with the exception of one gesture in section XIII), Boulez balances the gestures' directional motions by strictly alternating ascending and descending gestures. Feldman finds the same balance at a smaller level by tending towards

²² Gesture 5 appears in parentheses because only the second note of the gesture, the E \flat , is present.

two-note repeating figures (such as the oscillation between A and E described previously) whose unequal rhythms create a lopsided see-saw motion.

Also within each of the first seven *très lent* sections, Boulez specifies a unique rotating order of entries for the instrumental groups making up each chord. For instance, in section V, instrumental groups I, II, III and VIII play three chords. In each chord, the voices enter in a unique order as shown in table 2.

Table 2 Instrumental groups listed in order of entry by chord in section V of *Rituel*

Chord	Groups listed in order of entry
1	III VIII I II
2	I III II VIII
3	VIII II I III

Interestingly, the first publication of the score does not include these rotating entries; rather, the voices enter in unison. However, in a 1992 interview Boulez said, “if there are echoes played very quickly by groups entering each time in different order” the result is “much more interesting than having everybody play together.”²³ A corrected version of the score published in 1993 contains the staggered entries. Apart from their rotating order, these “echoes” create small planes of translational symmetry during the moments they appear.

Feldman often uses mirror symmetry about a vertical axis to guide voice entries (see example 6), creating visual patterns in the score to which the eye responds. Because this

²³ Pierre Boulez, interview by Maria Anna Harley, Paris, August 6, 1992, unpublished typescript transcribed from a tape recording, selected and edited by M.A. Harley, quoted in Maria Anna Harley, *Space and Spatialization in Contemporary Music: History and Analysis Ideas and Implementations* (Los Angeles: Moonrise Press, 1994), 165.

symmetry doesn't recur systematically and not all of the voices being heard adhere to this symmetry, the ear may have a harder time noticing it than the eye.

Example 6 Feldman, *Coptic Light*, mm. 97–104, woodwinds and brass

The image shows a page of a musical score for woodwinds and brass. The score is arranged in seven systems, each with two staves. The instruments are labeled on the left: FL (Flute), OB (Oboe), CL (Clarinet), BN (Bassoon), HN (Horn), TRP (Trumpet), and TBN (Trombone). The music is written in a complex, rhythmic style with many slurs and dynamic markings. A circled number '100' is visible at the top of the first staff. The notation is dense and intricate, reflecting the 'Crippled Symmetry' concept mentioned in the text.

In “Crippled Symmetry,” Feldman explains how he sometimes uses a “symmetrically staggered rhythmic series” to create “lopsided acceleration.”²⁴ He uses this device in the transition from measures 216–217, where the time signature changes from $\frac{8}{8}$ to $\frac{8}{4}$ as the rhythm in the timpani and vibraphones changes from quarter note quintuplets to quadruplets, resulting in a symmetrically staggered series of 5:4 to 4:3. In measures 240–41, the time signature changes

²⁴ Feldman, “Crippled Symmetry,” 135.

from $\frac{5}{8}$ to $\frac{4}{8}$ as the rhythm in the timpani and vibraphones changes from eighth note sextuplets to quintuplets, this time yielding 6:5 to 5:4. These rhythmic transitions could be considered a special combination of translational and rotational symmetry where both the rhythm and the meter decrease by the same unit, resulting in a rotation of pulse.

Feldman also points out his proclivity to “frame” symmetrical or asymmetrical events between equal amounts of rest, as in example 7, creating a mirror reflection.²⁵

Example 7 Feldman, *Coptic Light*, mm. 153–54, vibraphones

The opening of *Coptic Light* proliferates with another kind of small-scale mirror symmetry in the vertical opposition of the pitch gestures (example 8).

²⁵ Feldman, “Crippled Symmetry,” 140.

Example 8 Feldman, *Coptic Light*, mm. 9–16, woodwinds

The image shows a page of handwritten musical notation for woodwinds. It features four staves labeled FL. (Flute), OB. (Oboe), CL. (Clarinet), and BN. (Bassoon). The notation is dense and complex, with many notes, rests, and dynamic markings. A circled number '10' is visible at the top of the first staff. The overall appearance is that of a detailed and intricate musical score.

Despite their differences in compositional philosophy, Feldman and Boulez reach similar results in terms of atmosphere in these two works, owing at least in part to their frequent use of symmetry, a principle which tends to produce structures that feel static and non-linear. A synonym for symmetry is “rigid motion,”²⁶ and the affects of both *Rituel* and *Coptic Light* have been described in terms similar to this one. Boulez scholar Jonathan Goldman notes the “static energy” of *Rituel*, where “each part mov[es] energetically, but giv[es] an overall impression of

²⁶ Crowe, “Symmetries of Culture,” 3.

stasis,”²⁷ and columnist Lawrence Johnson uses an ocean metaphor to describe *Coptic Light*’s “nonlinear progression, proceeding in quiet undulating waves.”²⁸ But because symmetry is just a principle and not a system, the pieces remain distinct, especially in regard to scale. Boulez’s tendency to sectionalize and use symmetry to organize larger gestures creates a cyclicity mainly perceptible at the level of the piece or the section. Feldman’s proclivity to think in patterns at the level of the measure creates a balanced, static feeling within *Coptic Light*’s initial moments. To borrow Feldman’s imagery, the pieces could be likened to two rugs of equal dimensions, Boulez’s rug organized by fewer, larger motifs and Feldman’s by many smaller ones, both achieving through different methods a balance of motion and stasis.

²⁷ Goldman, “The Musical Language of Pierre Boulez,” 101.

²⁸ Lawrence Johnson, “A Fascination with the Sound of Silence,” *New York Times*, November 21, 1999, accessed December 15, 2016, <http://www.nytimes.com/1999/11/21/arts/music-a-fascination-with-the-sound-of-silence.html>.

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