

Kaleidoscopic Symmetries:
Time and Pitch Relations in Conlon Nancarrow's *Tango?**

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Kyle Gann, who has surveyed Conlon Nancarrow's *oeuvre*, describes Nancarrow's *Tango?* for solo piano thus: "What one hears is a lively counterpoint in which the lines have a clear tonal relationship but seem completely independent as to rhythm."¹

In this article I argue that the "lines" of Nancarrow's *Tango?* relate closely rhythmically, and that their rhythmic construction ties tightly to their "tonal relationship." In order to do so, I present several types of durations, chief among them fractional durations; define transformations on segments, primarily temporal transposition and inversion; and provide two loose formal categories I call parallel and palindromic.

The investigation begins with a snapshot of *Tango?*'s basic tempo structure. The work's multiple concurrent tempi motivate the choice of certain duration spaces, which I then define. After establishing these terms, I step back to place *Tango?* in its compositional context, compare it to more traditional tangos, and provide an overview of its form. I then zoom in to focus on two of the work's eight sections.



Tango? combines two to three tempi concurrently, with tempo ratios taken from the integers 3,4,5,6,7. The notated measure remains constant, at MM = 80, but subdivides into different numbers of pulses, articulating, in effect, different simultaneous

* This paper greatly expands a chapter of my dissertation "A Theory of Time Spaces for the Analysis of Twentieth-Century Music" (Ph.D. diss., University of Rochester, 2001). I would like to thank Scott Murphy and Panayotis Mavromatis for computer programs written to facilitate the calculation of idurs in *Tango?*. I am also grateful to anonymous readers and *Integral* editorial staff for their comments on the paper.

¹ Kyle Gann, *The Music of Conlon Nancarrow* (Cambridge: Cambridge University Press, 1995): 276.

tempi. In Example 1a, the top staff divides the measure into three pulses, the middle staff into four, and the bottom staff into five. The pianist's right hand plays the "melody" in the top staff; his/her left hand plays the "accompaniment" in the lower two staves.

Example 1. *Tango?. Multiple concurrent tempi.*

basic dur = measure

(a) mm. 0-3

Measure = 80

TS basic dur

$J = \frac{1}{3}$

$J = \frac{1}{4}$

$J = \frac{1}{5}$

fp

(b) idurs

pulses/measure	TS basic dur	idur-segments
3	$\frac{1}{3}$	$\langle \frac{1}{3}, \frac{2}{3} \rangle$
4	$\frac{1}{4}$	$\langle \frac{2}{4}, \frac{1}{4} \rangle$
5	$\frac{1}{5}$	$\langle \frac{1}{5}, \frac{2}{5} \rangle$

As is evident even from this short excerpt, the barline plays a primarily notational role: it does not structure musical meter, but coordinates the pacing of the three tempi. In general, the establishment of meter depends upon various criteria: sonic (chiefly phenomenal accent), contextual (repetition, parallelism), and structural (previously-established meter, notated meter, metric prototypes).² I say that *Tango?*'s time signatures and barlines

² I have borrowed the categories "sonic," "contextual," and "structural" from Dora Hanninen's criteria for segmentation. See Hanninen, "Orientations, Criteria, Segments: A General Theory of Segmentation for Music Analysis," *Journal of Music Theory* 45/2 (2001): 345-433, and *idem*, "A General Theory for Context-Sensitive Music Analyses: Applications to Four Works by Contemporary

represent tempo rather than meter because: (1) individual voices articulate the downbeat rarely or inconsistently;³ (2) parallel structures, such as repeated motives and patterns, tend to contradict rather than support the notated meter; and (3) Nancarrow's compositional process generally privileges tempo (in both compositional order and importance) over other parameters.⁴

Nancarrow considered tempo to be a primary dimension of musical composition. Changing tempi, accelerating/decelerating tempi, and multiple tempi in simple and complex ratios occupied much of his attention. He described his working method as follows: "I establish the pattern of temporal relationships before the pitches.... When I start to write the piece [after establishing the tempi], the melody and rhythm...are all done together." Speaking of his earlier studies for player piano, he said, "...these relationships are not, for example, 4 against 5 in the sense of a relationship within a measure. There is a tempo of 4 against [a tempo of] 5. I always think of 4 against 5 (or whatever) as a temporal relationship, not a measure relationship—the '4' going along at its speed and the '5' at its speed. The measure or the accents within each come at different points. Each is a free line in that tempo."⁵

Works characterized by multiple concurrent tempi feature prominently in the *oeuvre* of several twentieth-century composers, including Nancarrow, Elliott Carter, Charles Ives, Henry Cowell, György Ligeti, and Karlheinz Stockhausen.⁶ Analysts wishing to model durations in such works face the problem of choosing a referential unit. On the one hand, choosing units specific to each

American Composers," (Ph.D. diss., Eastman School of Music, University of Rochester, 1996).

³ Since it is the point at which all three tempi coincide, the notated downbeat is articulated more frequently than other points in the measure; nevertheless, in the overall context its status is tenuous.

⁴ Yvar Mikhashoff's transcription of the work in 2/4 meter throughout, using triplets and quintuplets, neglects the independent tempi of the individual lines. See Kyle Kevorkian, "Ursula Oppens: Tackling the Challenges of Contemporary Piano Repertoire," *Keyboard* (August 1987): 68, for an excerpt from Mikhashoff's transcription.

⁵ Roger Reynolds, "Conlon Nancarrow's Interview in Mexico City and San Francisco," *American Music* 2/2 (1984): 10, 12.

⁶ Multiple concurrent tempi also occur frequently in other repertoires such as jazz, and mensural music of the Renaissance.

tempo makes it difficult to discuss combined attack patterns; on the other hand, choosing an overall referential unit marginalizes the roles of the individual tempi.

Music theorists have proposed various models of measured durations, most commonly employing integers for labels.⁷ However, if, as in *Tango*?, multiple tempi relate by simple integer ratios, it makes good sense to use rational numbers rather than merely integers.⁸ This allows the analyst to have her cake and eat it too: she can choose tempo-specific referential units that relate at a glance to one another via an overall referential unit.⁹

For multiple-tempo works like *Tango*? I propose the following duration space. Duration-space (dur-space) measures temporal spans in terms of a basic duration (basic dur) that is defined in relation to some isochronous (evenly-spaced) pulse at a given tempo.¹⁰ The chosen basic dur should allow durations in a given passage to be expressed as multiples *or fractions* of it. Durations may be either positive, spanning earlier to later in time, or negative, spanning later to earlier. I restrict myself in this analysis to

⁷ See, for instance, David Lewin, *Generalized Musical Intervals and Transformations* (New Haven: Yale University Press, 1987): 22-25. Edward Pearsall, "Interpreting Music Durationally: A Set-Theory Approach to Rhythm," *Perspectives of New Music* 35/1(1997): 205-230 discusses unordered and ordered sets of such durations.

⁸ Dan Vuza, in "Sur le rythme périodique," in *Musikometrika* 1, ed. M.G. Boroda (Bochum: Brockmeyer): 83-126; and "Supplementary Sets and Regular Unending Canons" (Parts 1-3), *Perspectives of New Music* 29/2 (1991): 22-49, 30/1 (1992): 184-207, 30/2 (1992): 102-125 defines durations in the universe of rational numbers. Vuza presents his model abstractly, with few musical examples, and does not apply it to multiple-tempo passages. Lewin, *GMIT*: 60-61 also suggests the use of rational values for durations.

⁹ In some music there may be no overriding referential unit. See Lewin, *GMIT*: 60-81 which discusses the problems inherent in the choice of a single referential time unit, presents a solution in the form of a non-commutative generalized interval system (GIS) that defines durations and intervals contextually, and illustrates the GIS in a passage from Carter's first string quartet. In *Tango*?, however, the consistent measure at MM = 80 provides an obvious choice for basic referential unit.

¹⁰ This definition of the basic dur in relation to the musical pulse at a given tempo allows duration patterns at different tempi to be compared. It also allows duration patterns performed with deviations such as rubato, accelerando, or ritardando to be considered as equivalent.

absolute-value durations that ignore the forward or backward direction of the span.

I specify two applications of dur-space: (1) value-duration-space (vdur-space) in which value durations (vdurs) measure the notated lengths of events (sound and silence),¹¹ and (2) interval-duration-space (idur-space) in which interval durations (idurs) measure the time interval from one attack to another.¹² Examples 2a and 2b provide examples of vdur- and idur-spaces; the basic dur is the eighth note and rests are notated in brackets. Note that in order to define the last idur of a segment, the following attack must be taken into account.

For *Tango*?, let the measure be the basic dur. Example 1a displays two *de facto* levels of basic durs: (1) the overall referential unit (the measure) which equals 1, and (2) tempo-specific referential units (inter-beat durations at the various tempi) which equal $\frac{1}{3}$, $\frac{1}{4}$, and $\frac{1}{5}$ respectively. I will call the former the *basic dur*, and the latter *tempo-specific basic durs* (TS basic durs).

The right column of the chart in Example 1b shows idurs for the bracketed segments in Example 1a. One can read these idurs in terms of either level of basic dur: as fractions of the overall basic dur (measure), or as multiples of the relevant TS basic dur ($\frac{1}{3}$, $\frac{1}{4}$, or $\frac{1}{5}$). For the latter, one simply drops denominators, to arrive at <1,2> for top and bottom staves, and its retrograde <2,1> for the middle staff. In other words, $\frac{2}{3}$ represents both an idur that spans $\frac{2}{3}$ of a measure, and 2 TS basic durs occurring at a tempo of 3 TS basic durs per measure. The numerator of each fraction gives the

¹¹ Although the actual duration of an event is affected by its sound envelope and related factors such as articulation, timbre, and dynamics, for convenience I consider the notated length of an event to be its vdur.

Allen Forte, "Aspects of Rhythm in Webern's Atonal Music," *Music Theory Spectrum* 2 (1980): 90-109; and "Foreground Rhythm in Early Twentieth Century Music," *Music Analysis* 2 (1983): 239-268 uses vdurs (proportional graphs and attack-release partitions) to study rhythm in the music of Webern, Schoenberg, Bartók and Stravinsky; Julian Hook, "Rhythm in the Music of Messiaen: An Algebraic Study and an Application in the Turangalila Symphony," *Music Theory Spectrum* 20/1 (1998): 97-120 applies vdurs to the description and categorization of rhythmic patterns in the music of Olivier Messiaen.

¹² Music psychologists call this time interval the "inter-onset interval." Maury Yeston, *The Stratification of Musical Rhythm* (New Haven: Yale University Press, 1976): 55 calls it the "attack-point interval."

number of TS basic durs, while the denominator indicates the tempo at which those TS basic durs are occurring.

The “dropped-denominator” version (TS basic dur) facilitates the comparison of duration patterns at different tempi; I will use it when showing isomorphisms between individual lines at different tempi or between idurs and pitch-intervals. Otherwise, I will use the more specific fractional notation (basic dur = measure). The distinction will be made clear by the context.

One perceives measured durations most easily in the context of clear regular pulses. *Tango?* thumbs its nose at such regularity by combining multiple tempi concurrently and by articulating pulses within these tempi irregularly. According to Elizabeth West Marvin, “it is in this type of context, where no consistent beat unit can be perceived, that rhythmic contours of relative shorts and longs best model the listener’s perception.”¹³ Therefore I also borrow and adapt Marvin’s contour duration space.

As defined by Marvin, a contour duration space of order n consists of “elements numbered in order from short to long, beginning with 0 up to $(n-1)$...where the precise, calibrated duration of each duration is ignored and left undefined.”¹⁴ Like duration space, contour duration space can be applied to notated durations of events, or to inter-onset intervals. I call the former contour value duration space (cvdur-space) and its elements cvdurs, and the latter contour interval duration space (cidur-space) and its elements cidurs.¹⁵ Examples 2c and 2d give examples of cvdurs and cidurs, respectively. Cvdur-space is useful primarily for examining durational contours that involve “last” elements (final sonorities, phrases, sections, etc.) not defined by any following attack.¹⁶

¹³ Elizabeth West Marvin, “The Perception of Rhythm in Non-Tonal Music: Rhythmic Contours in the Music of Edgar Varèse,” *Music Theory Spectrum* 13/1 (1991): 65.

¹⁴ *Ibid.*: 65-66.

¹⁵ Cidur space is Marvin’s “duration space.” See *ibid.*: 61-78; also *idem*, “A Generalized Theory of Musical Contour: Its Application to Melodic and Rhythmic Analysis of Non-Tonal Music and Its Perceptual and Pedagogical Implications” (Ph.D. diss., University of Rochester, 1988).

¹⁶ Each of the temporal spaces defined above is isomorphic to some space in the pitch domain. Idur-space is analogous to a space consisting of unordered pitch

Example 2. Comparison of an ordered set of articulators in various spaces.



(a) vdur-space	4	1	1	[1]
(b) idur-space	4	1	2	
(c) cvdur-space	1	0	0	[0]
(d) cidur-space	2	0	1	
(e) p-space	G4	C4	F4	
(f) ord-p-int-space	-7	+5	-1	
(g) unord-p-int-space	7	5	1	
(h) pc-space	G	C	F	
(i) p-contour-space	2	0	1	

basic dur = ♩ (in vdur-, idur-space)

In addition to these temporal spaces, I employ the following pitch spaces: pitch-space (p-space); pitch-interval space (p-int-space), ordered (ord-) and unordered (unord-); pitch-class space (pc-space); and pitch-contour space¹⁷ (Examples 2e-i). As is standard in the literature, I call unordered sets of elements in these spaces "sets" and notate them with curly brackets { }; I call ordered

intervals, while cidur-space relates to Marvin's pitch-span contour space, a space consisting of intervals between pitches, numbered from small to large. See Marvin, "A Generalization of Contour Theory to Diverse Musical Spaces: Analytical Applications to the Music of Dallapiccola and Stockhausen," in *Concert Music, Rock, and Jazz since 1945*, eds. Elizabeth West Marvin and Richard Hermann (Rochester: University of Rochester Press, 1995). Vdur- or cvdur-space would correspond to spaces consisting of pitches and intervals attached to those pitches (intervals defined without reference to any second pitch).

¹⁷ Pitch-contour space labels pitches from low to high with increasing positive integers starting from 0. Robert Morris defines pitch-contour space in his *Composition with Pitch-Classes: A Theory of Compositional Design* (New Haven: Yale University Press, 1987): 26.

sets "segments" (segs) and place them in angle brackets < >. For ease of reading p-segs, I omit register numbers when context makes them clear. In addition, I refer more generally to both p-ints and idurs as "intervals," since both represent distances between points (that is, intervals between pitches, and durations between attack points, respectively).

I also define two temporal transformations—*Transposition* and *Inversion*—that correspond to generalized versions of the familiar pitch transformations. Example 3 illustrates the transformations using segments comprised of elements a, b, and c ordered in sequential time (earlier to later) and relative-pitch space (lower to higher). Broken arrows indicate transpositional relationships and solid arrows inversive relationships. Italicized *T* and *I* distinguish temporal transposition and inversion from pitch transposition and inversion (*T* and *I*). The lower portion of Example 3a and the right side of Example 3b show that transposition and inversion can occur concurrently on different levels: transposition can take place within inversion, and vice versa.

The exact intervals of the transformations remain undefined since I am primarily interested in more general order relations. My temporal transposition and inversion therefore represent nothing more than repetition and retrograde, respectively: temporal transposition shifts a seg "earlier" or "later" in time; temporal inversion retrogrades it. I use the terms transposition and inversion for both pitch and rhythm because I wish not only to examine rhythmic structure, but also to highlight relations between rhythm and pitch.

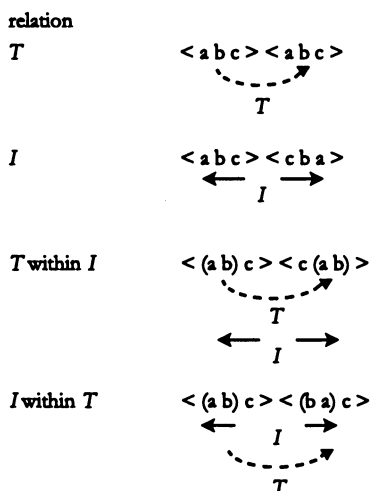
These four simple and general transformations (*T*, *I*, *T*, *I*,) provide surprisingly apt ways of describing structure and process in Nancarrow's *Tango*?. To simplify description I will call structures characterized by transpositional relationships "parallel" structures, and those characterized by inversive symmetry "palindromic" structures.¹⁸

¹⁸ These structures generalize concepts of symmetry presented by other writers. Jonathan Bernard, "Space and Symmetry in Bartók," *Journal of Music Theory* 30/2 (1986): 185-201, for example, describes two types of pitch-symmetry in Bartók: mirror (inversive) and parallel (transpositional). He also shows Bartók's use of temporal parallel and palindromic relations, albeit without defining them explicitly. Interrelations of pitch palindromic and parallel structures have also

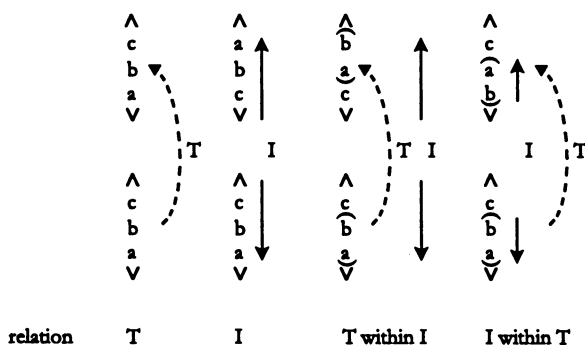
Example 3. Transposition and inversion in sequential time and relative-pitch space.

----- transposition
 ——— inversion

(a) ordered in sequential time (earlier to later)



(b) ordered in relative-pitch space (lower to higher)



been explored in Richard Cohn, "Inversional Symmetry and Transpositional Combination in Bartók," *Music Theory Spectrum* 10 (1988): 19-42; and *idem*, "Transpositional Combination in Twentieth-Century Music" (Ph.D. dissertation, University of Rochester, 1987).

Tango?

In 1983, pianist Yvar Mikhashoff began collecting works for the *International Tango Collection*, extending invitations to more than one hundred composers from thirty countries. Conlon Nancarrow contributed *Tango?*¹⁹

The title's question mark presumably references the work's non-traditional aspects, most obviously its quirky rhythmic structure. When asked about the question mark, Nancarrow said, "...the tango is really not my field. But...the international aspect of [Mikhashoff's tango collection] appealed to me. That's why I did it, in spite of the fact, as I say, that it's not a tango."²⁰

Despite Nancarrow's negation, *Tango?* does bear unmistakable if subtle resemblances to a more traditional body of tango literature.²¹ Its solo-piano instrumentation recalls the simplified *tangos para piano* in wide circulation in the early part of the century.²² Its texture—lyrical melody and quicker-moving accompaniment—characterizes many instrumental and vocal tangos. As exhibited in Example 4, *Tango?* employs a basically diatonic vocabulary (harmonic thirds, fourths, fifths, sixths, and

¹⁹ Susan Feder, notes for CD 1 of Ursula Oppens, *American Piano Music of Our Time*, Music and Arts Programs of America CD 862: 3. According to Kristin Wendland, "La Atracción de Tango: Compositores norteamericanos y El Proyecto Internacional de Tango de Yvar Mikhashoff," paper read at Universidad Católica Argentina, Instituto de Investigación Musicológica Carlos Vega, Buenos Aires, Argentina, August 5, 2004: 2-3, the completed collection contains 126 tangos, held at the Yvar Mikhashoff Archive at SUNY Buffalo.

²⁰ Bob Doerschuk, "Conlon Nancarrow: the Unsuspected Universe of the Player Piano," *Keyboard* (January 1987): 57.

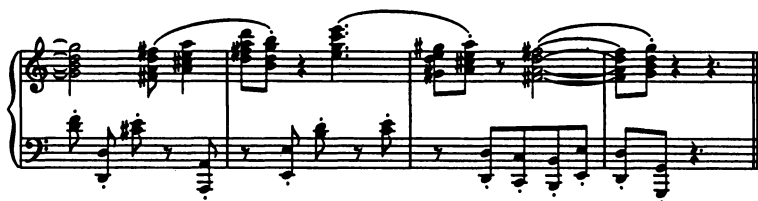
²¹ By "more traditional tangos," I am referring broadly to tangos that come more or less directly out of the Argentine tango tradition. This wide category includes both the original dance compositions played by *orquestas típicas*, and their lineage: vocal tangos, simplified tangos for solo piano, "new tangos" developed by composers such as Astor Piazzolla, and so on. I contrast these "more traditional tangos" to art compositions that comment on, borrow elements of, and otherwise highly stylize tango features.

I am grateful to Kristin Wendland for her comments on my discussion of tango elements in this article, and for supplying me with many recorded and notated examples of Argentine tangos.

²² Wendland, "Atracción:" 5 discusses *tangos para piano*.

triads) and articulates a tonal center (G). It thus stays close to the diatonic orbit of more traditional tangos. The piece's sectional construction and variation of repeated sections also recall traditional tango practice, although its eight sections outnumber those in the standard tango.

Example 4. Tango?. Final cadence.



Rhythm plays a defining role in both *Tango?* and the more traditional tango literature. During its historical development, the stylized tango began incorporating meter changes such as 4/4 to 6/8 (keeping the eighth note constant), and, as shown in Example 5a, deriving new durational patterns such as idur-seg <3,3,2> from the standard accompanimental <3,1,2,2>.²³ Example 5b demonstrates these transformations in a tango for flute and guitar by Astor Piazzolla. In Nancarrow's *Tango?*, changes in the notated meter delimit distinct sections, and idur-seg <3,3,2> features prominently in section 2. Furthermore, both tangos and *Tango?* feature a characteristic syncopated melodic figure <1,2,1> (see, for example, Example 6a, m. 59), and both repeat pitch motives while changing their durational guises and metric placements. Finally, traditional tango performance features a certain rhythmic flexibility—a flexibility that finds a counterpart in Nancarrow's combination of concurrent different tempi.

²³ <3,1,2,2>, a common tango accompaniment pattern, derived from the *milonga*. See Kristin Wendland, "Rhythm, Meter, and Dance of the Argentine Tango," paper presented to the Dance and Culture Area of the Popular Culture Association, 5th Congress of the Americas, Puebla, Mexico, October 19, 2001: 10. Combining the middle two elements (underlined) of <3,1,2,2> results in <3,3,2>. I thank Luis Gonzalez for pointing out this relationship to me.

Example 5. Traditional tango idur-segs.

(a) idur-segs (basic dur = ♩)

$\frac{4}{4}$ ♩ ♩ ♩ ♩ ♩
 $\langle 3,1,2,2 \rangle$
 transformed into
 $\frac{4}{4}$ ♩ ♩ ♩ ♩ ♩
 $\langle 3, (1+2), 2 \rangle = \langle 3,3,2 \rangle$
 or
 $\frac{8}{8}$ ♩ ♩ ♩ ♩ ♩
 $\langle 3, (1+2), 2 \rangle = \langle 3,3 \rangle$

(b) illustrated in Astor Piazzolla's *Histoire du Tango*, "Concert d'aujourd'hui"

74 f $\frac{1}{2}$ B4 1
 Guitar $\langle 3 \rangle$ 1 2 2 >
 91
 Flute
 Guitar $\langle 3 \rangle$ 3 2 > 3 > 3 >

Overview

The work comprises eight sections: an introduction followed by seven variations on a pitch-duration melodic pattern. I label the sections from 0 to 7, with 0 representing the introduction.

Example 6 shows the melodic lines of the sections and their associated idurs, using TS basic durs (quarter note in sections 0, 1, and 6; eighth note in sections 2, 3, 4, 5, and 7).²⁴ I divide the melody of each section into three portions: “core” (Example 6a), “extension” (Example 6b), and “tail” (Example 6c).²⁵ The cores of all sections, except section 0, express the same pitch succession to within transposition.²⁶ All section cores also articulate the same succession of idurs (in TS basic durs),²⁷ with one of two variations. The cores either begin with idur-seg X = <1,2,2,2,1,2,4>, or Y = <1,2,3,2,1,2,5>. (The underlined idurs in Y add 1 to the corresponding elements in X.)

The extensions continue the equivalence in pitch under transposition, and in rhythm in TS basic durs.²⁸ All begin with idur 2 and then repeat the idur succession of the core, beginning

²⁴ I call the right-hand part the “melody” and the left-hand part the “accompaniment” throughout the work, even in section 0, where the left-hand line might be better called the “melody.” Section 0’s left hand resembles the other sections’ melodic lines in its legato articulation and pitch gestures. However, unlike the other melodic lines, it does not display transpositional equivalence, nor does it maintain one tempo (it toggles between two tempi, like the accompaniments of the other sections). Section 0’s right hand resembles the other sections’ melodic lines in other important respects: idur pattern in TS basic durs, single staff and hence single tempo. Primarily for expedience, but also because of these cross connections between right- and left-hand lines in section 0 and the piece’s other sections, I consistently label the upper part as “melody” and the lower part as “accompaniment.”

²⁵ Section 0 consists of a core only, establishing the length of the core for following sections. Section 5 has a shorter core than the other sections, and no extension; section 6 has a shorter extension than the other sections, and no tail.

²⁶ An exception, found in the second measure of section 7, is shown in a diamond in Example 6.

²⁷ Exceptions, shown in Example 6 in diamonds, occur in section 6, primarily at longer idurs. The idur-structure at the end of section 0 is also slightly different from that of the other sections.

²⁸ Exceptions, found in section 6, are shown in diamonds in Example 6.

Example 6. Tango?.. Eight sections. Melodic lines and their idurs.

(a) core

The musical score consists of eight staves, each representing a section of the piece. Each staff begins with a measure number (0, 1, 2, 3, 4, 5, 6, 7) and a section number (0, 1, 2, 3, 4, 5, 6, 7). The notation includes melodic lines with various note values and rests, and idur patterns indicated by numbers 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 118, 119, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129, 130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 157, 158, 159, 160, 161, 162, 163, 164, 165, 166, 167, 168, 169, 170, 171, 172, 173, 174, 175, 176, 177, 178, 179, 180, 181, 182, 183, 184, 185, 186, 187, 188, 189, 190, 191, 192, 193, 194, 195, 196, 197, 198, 199, 200, 201, 202, 203, 204, 205, 206, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 221, 222, 223, 224, 225, 226, 227, 228, 229, 230, 231, 232, 233, 234, 235, 236, 237, 238, 239, 240, 241, 242, 243, 244, 245, 246, 247, 248, 249, 250, 251, 252, 253, 254, 255, 256, 257, 258, 259, 260, 261, 262, 263, 264, 265, 266, 267, 268, 269, 270, 271, 272, 273, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 285, 286, 287, 288, 289, 290, 291, 292, 293, 294, 295, 296, 297, 298, 299, 300, 301, 302, 303, 304, 305, 306, 307, 308, 309, 310, 311, 312, 313, 314, 315, 316, 317, 318, 319, 320, 321, 322, 323, 324, 325, 326, 327, 328, 329, 330, 331, 332, 333, 334, 335, 336, 337, 338, 339, 340, 341, 342, 343, 344, 345, 346, 347, 348, 349, 350, 351, 352, 353, 354, 355, 356, 357, 358, 359, 360, 361, 362, 363, 364, 365, 366, 367, 368, 369, 370, 371, 372, 373, 374, 375, 376, 377, 378, 379, 380, 381, 382, 383, 384, 385, 386, 387, 388, 389, 390, 391, 392, 393, 394, 395, 396, 397, 398, 399, 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600, 601, 602, 603, 604, 605, 606, 607, 608, 609, 610, 611, 612, 613, 614, 615, 616, 617, 618, 619, 620, 621, 622, 623, 624, 625, 626, 627, 628, 629, 630, 631, 632, 633, 634, 635, 636, 637, 638, 639, 640, 641, 642, 643, 644, 645, 646, 647, 648, 649, 650, 651, 652, 653, 654, 655, 656, 657, 658, 659, 660, 661, 662, 663, 664, 665, 666, 667, 668, 669, 670, 671, 672, 673, 674, 675, 676, 677, 678, 679, 680, 681, 682, 683, 684, 685, 686, 687, 688, 689, 690, 691, 692, 693, 694, 695, 696, 697, 698, 699, 700, 701, 702, 703, 704, 705, 706, 707, 708, 709, 710, 711, 712, 713, 714, 715, 716, 717, 718, 719, 720, 721, 722, 723, 724, 725, 726, 727, 728, 729, 730, 731, 732, 733, 734, 735, 736, 737, 738, 739, 740, 741, 742, 743, 744, 745, 746, 747, 748, 749, 750, 751, 752, 753, 754, 755, 756, 757, 758, 759, 760, 761, 762, 763, 764, 765, 766, 767, 768, 769, 770, 771, 772, 773, 774, 775, 776, 777, 778, 779, 780, 781, 782, 783, 784, 785, 786, 787, 788, 789, 790, 791, 792, 793, 794, 795, 796, 797, 798, 799, 800, 801, 802, 803, 804, 805, 806, 807, 808, 809, 810, 811, 812, 813, 814, 815, 816, 817, 818, 819, 820, 821, 822, 823, 824, 825, 826, 827, 828, 829, 830, 831, 832, 833, 834, 835, 836, 837, 838, 839, 840, 841, 842, 843, 844, 845, 846, 847, 848, 849, 850, 851, 852, 853, 854, 855, 856, 857, 858, 859, 860, 861, 862, 863, 864, 865, 866, 867, 868, 869, 870, 871, 872, 873, 874, 875, 876, 877, 878, 879, 880, 881, 882, 883, 884, 885, 886, 887, 888, 889, 890, 891, 892, 893, 894, 895, 896, 897, 898, 899, 900, 901, 902, 903, 904, 905, 906, 907, 908, 909, 910, 911, 912, 913, 914, 915, 916, 917, 918, 919, 920, 921, 922, 923, 924, 925, 926, 927, 928, 929, 930, 931, 932, 933, 934, 935, 936, 937, 938, 939, 940, 941, 942, 943, 944, 945, 946, 947, 948, 949, 950, 951, 952, 953, 954, 955, 956, 957, 958, 959, 960, 961, 962, 963, 964, 965, 966, 967, 968, 969, 970, 971, 972, 973, 974, 975, 976, 977, 978, 979, 980, 981, 982, 983, 984, 985, 986, 987, 988, 989, 990, 991, 992, 993, 994, 995, 996, 997, 998, 999, 1000.

Example 6 (continued). Tango?. Eight sections. Melodic lines and their idurs.

Section
TS
basic
dur

(b) extension

(c) tail

0
J

1
J

2
J

3
J

4
J

5
J

6
J

7
J

with idur-seg Y. The tails do not exhibit these equivalencies of pitch or rhythm.

The work's sections differ from one another in melodic pitch level, dynamic, relative tempo, textural density, articulation, opening idur-seg, and sectional duration (in both TS basic durs and measures).²⁹ Example 7 depicts each of these dimensions as a high-low contour (except for accompaniment tempi, which combine two tempi at a time; and texture and articulation, where the contour is visually evident).³⁰

Each dimension articulates some variation on an "up-down-up" contour, generally following the pattern shown in Example 8.³¹ The begin-end of this zigzag—sections 0 and 7—thus combine dimensional minima or maxima in a straightforward way: section 0 is quietest, slow, thin in texture, and shortest in number of TS basic durs; section 7 is loudest, fastest, thickest in texture, and shortest in number of measures.³² Since the middles of the zigzags for the various dimensions do not coincide, however, close-to-the-end sections 5 and 6 juxtapose opposing dimensional levels, to startling and whimsical effect. The upward climb in sections 0-4 leads us to

²⁹ Although all sections are based on a common core, differing lengths of extensions and tails produce differing section lengths, whether measured in terms of numbers of measures (actual duration), or in terms of TS basic durs.

³⁰ For "beginning melodic pitch" in Example 7a, section 0's right-hand "melody" is given as a filled-in notehead, and its left-hand melody as a small whole note. The "relative tempi" in Example 7c refer to the numbers of pulses per measure (measure = MM 80), as indicated by the numerator in Nancarrow's meter signatures. (The melody of section 6 is an exception: its 5/8 meter signature actually indicates 2.5 quarter-note pulses to the measure.) For sectional duration in measures in Example 7g, I have "flipped" the orientation of relative short-long, on the assumption that shorter sectional duration (in measures) implies greater intensity. (For sectional duration in TS basic durs in Example 7f, I have kept the short-long = low-high orientation, because the greater the number of TS pulses, the more activity.) Gann, *Music of Conlon Nancarrow*: 275, provides a similar but less detailed chart.

³¹ The only exception, melodic pitch level, also follows this contour if section 0's left-hand part (small whole note in Example 7a) is considered its melody.

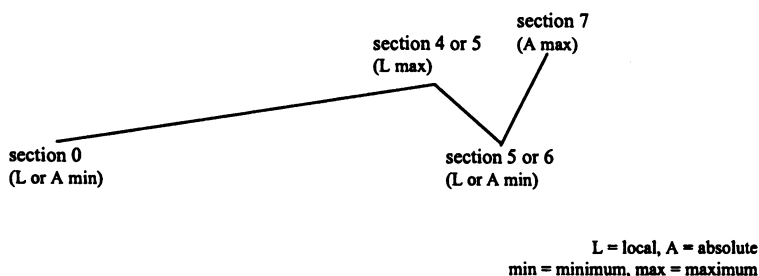
³² In this paragraph I list only absolute and local maxima/minima, indicating absolute maxima/minima with superlative adjectives, and local maxima/minima with simple adjectives. "Slow" and "fast" refer to melodic tempi only. For "short" and "long" see note 30. Section 0 is also lowest if its left hand is considered its melody.

Example 7. Tango?. Contour overview.

Section	0	1	2	3	4	5	6	7	
(a) beginning pitch melody									
(b) dynamics	<i>pp</i>	<i>p</i>	<i>mp</i>	<i>mf</i>	(<i>f</i>)	<i>ff</i>	<i>pp</i>	<i>fff</i>	
(c) relative tempi melody	3	3 → 4		5	6	4	(5) 2.5	7	
accompaniment	4 5	4 5	6 5	6 4	5 4	6 5	6 4	5	
(d) texture and articulation melody accompaniment									
	melody: ♩ = dyad; [] = four-note chord (melody doubled at the 8ve) accompaniment: ♯♭ = 3rd; ♮ = 8ve								
(e) opening idur-seg melody	X	X	Y	Y	Y	X	Y	Y	
	idur-seg X = <1 2 2 2 1 2 4> idur-seg Y = <1 2 3 2 1 2 5>								
(f) sectional duration no. of TS basic durs	69	108	128	120	120	72	90	112	
(g) sectional duration no. of measures	23	36	32	24	20	18		16	
	36								

expect a continuation in section 5, which is indeed louder and shorter (in measures) than the preceding sections. However, section 5 unexpectedly juxtaposes its “high” points with the piece’s lowest pitch level and thinnest texture. The lagging minima—softest, slowest, longest (in measures)—enter in section 6—in surprising contrast to the work’s highest pitch level.³³

Example 8. Tango?. Up-down-up contour.



Section 6 recalls the dynamic level and similar tempo of the work’s opening, and displays exactly the same texture and duration (in measures) as section 1. This repetition sets sections 1-6 off from sections 0 and 7, each of which distinguishes itself from the other sections in its own way: section 0 by virtue of its unique melody, and section 7 since it is the only section that contains two concurrent tempi rather than three.

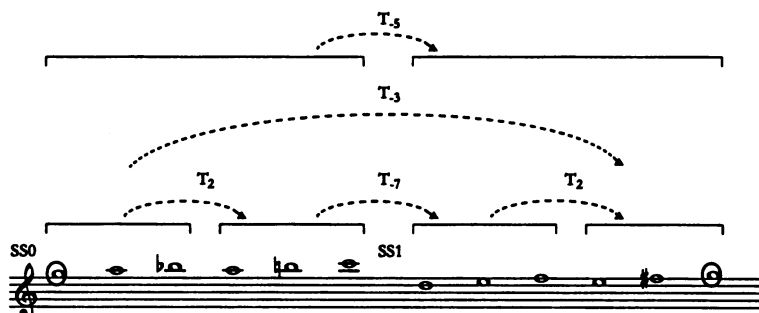
These contours exemplify principles underlying Nancarrow’s compositions at various levels: subtle and shifting symmetries created through juxtaposition of opposites, and through processes of bringing repeated patterns in and out of alignment. The contours also demonstrate an emphasis on {2,3,5,7}, often paired as {2,3} and {5,7}. As shown in Example 7, numbers of discrete levels feature 7 and 5 prominently: the work involves 7 different dynamic levels, 7 types of texture/articulation (taking the melody and

³³ Section 5 is also emphasized by its shorter core and lack of extension, and section 6 by its shorter extension, lack of tail, and altered idurs.

accompaniment of each section as a unit), 7 different sectional durations (in either TS basic durs or measures), and 5 different notated melodic tempi (and a unique ordered pair of accompaniment tempi associated with each). The accompaniment contains 3 different notated tempi in its top strand, and 2 in its lower strand. Every section combines 3 concurrent tempi, except the last, which combines 2 tempi: 7 and 5. The work's beginning melodic pitches (Example 7a) form pc set {0257}, containing interval classes 2, 3, and 5 exclusively.

In the following, I demonstrate how these sets—{2,3} and {5,7}, and one more, {1,2}—pervade *Tango?*'s rhythmic and pitch structure on smaller levels. I also explore how the play of the principles described above—juxtaposition of opposites, shifting alignments—produces kaleidoscopic symmetries.

Example 9. Tango?. Section 0's overall melodic pitch structure.



Sections 0 and 2

I will focus on two of the work's eight sections. All units (sections, subsections, measures, etc.) are numbered from 0.

Example 9 summarizes the melodic structure of section 0, dividing it into two subsections (SS 0 and 1) based on melodic p-segs <G,A,B♭>, <A,B,C>, and <D,E,F> <E,F♯,G> respectively.³⁴ It

³⁴ The reader is reminded that I omit pitch register numbers when they are clear in context. Here <G,A,B♭> stands for <G5,A5,B♭5>, <A,B,C> for <A5,B5,C6>, etc.

encapsulates set {2,3,5,7}: T_2 relates pitch-segs within subsections, T_5 between subsections; $T_{.7}$ and $T_{.3}$ complete the picture. These parallel relations occur within an overall symmetrical structure that departs from and returns to pitch G5.

Examples 10 and 11 display subsections 0 and 1 respectively. Each subsection, and indeed the entire section, presents a kaleidoscope of parallel and palindromic structures. I begin with the $\langle G, A, Bb \rangle$ portion of subsection 0. As shown in Example 10, two melodic repetitions of $\langle G, A, Bb \rangle$ articulate *T*-related ord-p-int segs, and *I*-related idur segs, whose respective elements—{2,1} and $\{^2/3, ^1/3\}$ —are isomorphic to one another. The accompaniment to these repetitions of $\langle G, A, Bb \rangle$ again expresses *T* and *I* relations: *T*-related unord-p-int segs, and *I*-related cidur-segs (as well as *I*-related ord-p-int segs). These pairs of segs in melody and accompaniment stack, forming a quasi-palindromic unit.

A slight shift of the kaleidoscope extends the unit further. The accompaniment repeats the slurred \langle quarter, eighth, staccato eighth \rangle figure; the two statements together articulate a descent from G4 to C4, first by leap, then by stepwise motion. The inclusion of this new seg expands the old quasi-palindromic structure (mm. 0-2) to a new, larger one (mm. 0-3). In this larger quasi-symmetrical structure, the accompaniment arches from D4 up to G4 and back down. It moves from fast ($^1/5$) to slow ($^1/4$) to fast ($^1/5$) pulses, and (segmenting by tempo) frames the middle palindromic idur-seg $\langle ^2/4, ^1/4, ^2/4 \rangle$ with outer idur-segs $\langle ^1/5, ^2/5 \rangle$, articulation-seg \langle slur-staccato, staccato \rangle , and pitch D4.

The “middle” accompaniment idur-seg results from extending $\langle ^2/4, ^1/4 \rangle$ by $^2/4$. Above it, the melody similarly extends its idur-seg $\langle ^2/3, ^1/3 \rangle$ by $^2/3$ to arrive at pitch A5 in m. 3. This A5 groups with the preceding $\langle G, A, Bb \rangle$ melodic segs because it is separated from following melodic material by a rest of idur $^7/6$, the longest rest thus far.

So, after first hearing mm. 0-2 as a quasi-palindrome, we now have a new unit, mm. 0-3, held together by the quasi-palindromic structure in the accompaniment. Something about this larger

Pc set class [013] features prominently in several of Nancarrow's works. See, for example, String Quartet No.3 (1988), and Player Piano Studies 7, 10 (revised version, published in 1985): 20, 31.

structure is not quite complete, however (the melodic A5, though grouping with the unit, doesn't quite fit the palindromic structure), and this prompts another turn of the kaleidoscope.

In mm. 4-6, the longest melodic rests thus far ($7/6$ and $5/6$) separate melodic p-seg <B,C,A,B> from its surroundings. This seg articulates a palindromic idur-seg $\langle 1/3, 2/3, 1/3 \rangle$ that links the melodic idur-segs $\langle 1/3, 2/3 \rangle$ and $\langle 2/3, 1/3 \rangle$ of mm. 0-2.³⁵ Its quasi-palindromic accompaniment frames idur-seg $\langle 3/4, 3/4 \rangle$ with articulation-seg <slur-staccato>. In mm. 4-6, then, melody and accompaniment align to form a small quasi-palindrome.

Expanding outwards to mm. 3-7, we note the repetition of melodic p-seg <A,B,C>. As with its precursor <G,A,Bb>, the repeating <A,B,C> articulates T-related p-int segs and I-related cidur-segs. The <A,B,C> portion as a whole transposes (*T* and *T*₂) the pitch structure and inverts (*I*) the cidur-segs of the preceding <G,A,Bb> portion.

The accompaniment in mm. 3-7 also echoes preceding material. As with their overlapping predecessor (mm. 0-3), measures 3-7 in the accompaniment arc from low to high to low (leap to G4 and stepwise descent to C4), move from fast to slow to fast ($1/5$ to $1/4$ to $1/5$, TS basic durs), and span a middle portion that articulates p-seg <G,F,E>, associated with idurs $\langle 3/4, 3/4 \rangle$.

Outer measures 3 and 7 frame inner measures 4-6. Taking both melody and accompaniment into account, both m. 3 and m. 7 end with idur-seg $\langle 2/5, 2/5 \rangle$, associated with pitch-segs <C4,D4> and <D4,C4> respectively. (Note the isomorphism in interval— $2/5$, and 2—and the combination of T idur relations with I pitch relations.) Similarly, both measures express idur-seg $\langle 1/5, 2/5 \rangle$, with p-segs <D4,C4,D4> (m. 3) and <C6,D4,C4> (m. 7)³⁶ (again articulating T idur-relations and I pitch(class)-relations). Measures 3-7 thus crystallize a "new" palindrome that overlaps with the "old" palindrome from mm. 0-3.

³⁵ A formal definition of LINK would read thus: LINK(X,Y) elides two segments X and Y at a common boundary element. For example, let X = <3,2,5> and Y = <5,4,1,1>. Then LINK(X,Y) = <3,2,5,4,1,1>. (The common boundary element is underlined for the reader's convenience.)

³⁶ The latter seg begins with the melodic C on the downbeat of m. 7.

In addition to overlapping with it, the new palindrome *expands* the old. Borrowing John Roeder's concept of isochronous (equally-spaced) pulse streams,³⁷ I identify two levels of pulse streams in this melody (shown in the center of Example 10). The first, involving mostly successive attacks, changes its idur from $\frac{2}{3}$ (mm. 0-3) to $\frac{3}{3}$ (mm. 3-7). The second, spanning onsets of successive three-pitch segments, extends from $\frac{5}{3}$ (<G,A,B>) to $\frac{7}{3}$ (<A,B,C>). These pulse streams demonstrate the work's privileged ratios 2:3 and 5:7.

These ratios, and their companion ratio 1:2, appear frequently in pitch as well as in time. In addition to the omnipresent ord-p-int seg <2,1> (and its various transformations <-2,-1>, <-1,-2>, etc.), the accompaniment opens with <7,5> (mm. 0-2), and the melodic p-segs relate by T_2 , part of section 0's constellation of melodic T_2 , T_3 , T_5 , and T_7 relations.

Our slow kaleidoscope turns have thus revealed two overlapping sets of nested quasi-palindromes:

1a. mm. 0-2

1b. mm. 0-3 (accompaniment), which aligns with the temporal segmentation of the melody

2a. mm. 4-6

2b. mm. 3-7, which overlaps with and expands (1b) above.

In short, the lines that "have a clear tonal relationship but seem completely independent as to rhythm" actually synchronize in constantly shifting yet quasi-symmetrical fashion.

My observations have resonances for performance. One can hear mm. 0-2 as palindromic, the accompaniment in m. 3 extending this palindrome, with the melodic A5 in m. 3 "going along for the ride" and "hanging" quirkily until the rest of its <A,B,C> p-seg comes in. A slower-motion version of the opening measures happens in mm. 3-7: the expanding melodic idurs and sparser accompanimental texture, together with the expansion in register both upwards and downwards, "lift" the second part of the

³⁷ John Roeder, "Interacting Pulse Streams in Schoenberg's Atonal Polyphony," *Music Theory Spectrum* 16/2 (1994): 234. Roeder defines a *pulse* as "a series of successive, perceptibly equal timespans, marked off by accented timepoints.... A minimum of two equal timespans is necessary to *activate* a pulse..." "At any given timepoint more than one pulse may be active, each composed of a distinct, characteristic, repeated timespan. The independent nature of each pulse in a multipulse texture is emphasized by calling it a *pulse stream*."

subsection in preparation for the next subsection (m. 8ff.). This way of conceptualizing the passage—its segments, the alignment of its melody and accompaniment, the kaleidoscopic shifts that turn each quasi-symmetric segment into the next—can enrich rehearsal and performance of it.

Example 11 shows subsection 1 (SS 1). Like SS 0, its melodic material consists primarily of two p-segs (<D,E,F> and <E,F♯,G>) related by T_2 and characterized by ord-p-int seg <2,1>.

Example 12. Tango?. Section 0. Relations between subsections 0 and 1.

The diagram illustrates the musical relationships between two subsections, SS 0 and SS 1, in a tango. SS 0 is shown at the top with a melodic line and an accompaniment line. The melodic line is labeled 'idur pitch' and has a segment marked with a box containing '0'. The accompaniment line is labeled 'pitch'. SS 1 is shown below SS 0, also with a melodic line and an accompaniment line. The melodic line is labeled 'idur pitch' and has a segment marked with a box containing '1'. The accompaniment line is labeled 'pitch'. Arrows indicate transpositions (T_5) and inversions (I) between the two subsections. A solid arrow labeled I points from the opening of SS 0 to the opening of SS 1. A dashed arrow labeled T_5 points from the opening of SS 1 to the opening of SS 0. The melodic segments are labeled with intervals: < 1/3, 2/3 > for SS 0 and < 1/3, 2/3 > for SS 1.

Although I will not narrate them in detail, this subsection recrystallizes shards and symmetries from the preceding subsection. Example 12 shows, for example, a cycle of relations connecting the openings of the two subsections. SS 1's opening melodic seg <D,E,F> clearly recalls SS 0's opening via pitch and idur transposition: T_5 of <G,A,B♭>, and exact repetition of associated idur-seg <1/3, 2/3>. SS 1's accompaniment *Inverts* its melodic p-seg

Example 11. *Tango?*. Section 0, subsection 1 (mm. 8-22).

(a) SS 1.0

idur $< \frac{1}{3} \quad \frac{2}{3} >$ rest ($\frac{1}{10}$) $< \frac{2}{3} \quad \frac{1}{3} \quad \frac{2}{3} >$ rest ($\frac{3}{6}$)

melody
pitch

accompaniment
pitch

(b) SS 1.1

idur $\frac{2}{3} \quad \frac{1}{3} \quad \frac{2}{3} \quad \frac{1}{3} \quad \frac{2}{3} \quad \frac{1}{3} \quad \frac{2}{3} \quad \frac{1}{3} \quad \frac{2}{3} \quad \frac{1}{3}$

melody
pitch

accompaniment
pulse
idur $< \frac{2}{3} \quad \frac{1}{3} >$ $\frac{2}{3} \quad \frac{1}{3}$ $< \frac{2}{3} \quad \frac{1}{3} >$
ord. point $< -2 \quad -1 >$ $< -2 \quad -1 >$ $-2 \quad -2$ $< -2 \quad -1 >$ $< -2 \quad -2 >$ $< -2 \quad -1 >$

to $\langle F, E, D \rangle$,³⁸ and completes the transformational circle by moving via T_5 to $\langle Bb, A, G \rangle$, an *Inversion* of opening melodic material an octave lower. The accompaniment $\langle Bb, A, G \rangle$ seg stands out since it occurs “solo,” and since $Bb4$ is the highest and longest note of the accompaniment thus far.

In addition, the accompanimental symmetries shown in Example 11b bring back characteristic features of SS 0 accompaniment palindromes: framing idur-seg $\langle ^1/5, ^2/5 \rangle$ (now *Inverted* to $\langle ^2/5, ^1/5 \rangle$) associated with pcs $\{D, C\}$, and middle p-seg $\langle G, F(\emptyset), E \rangle$ associated with idur-seg $\langle ^3/x, ^3/x \rangle$. We can also note isomorphisms in pitch and time: the melodic $\langle 2, 1 \rangle$ and accompanimental $\langle -2, -1 \rangle$ ord-p-int segs echo the melodic alternation of $\{^2/3, ^1/3\}$ idurs.

More importantly, subsections 0 and 1 employ similar processes of palindromic formation. In both subsections: (1) melody and accompaniment together form a palindrome; (2) the accompaniment extends the palindrome to form another palindrome while the melody “hangs” above it; and (3) the hanging melody connects to a larger palindrome that subsumes (1) and (2). We have already seen this process in SS 0. Following are two instances from SS 1.

First, in mm. 8-13, (1) an Inversional relation between $\langle D, E, F, D \rangle$ in the melody and $\langle F, E, D, F \rangle$ in the accompaniment defines an initial unit,³⁹ which (2) extends to the accompaniment’s $\langle Bb, A, G \rangle$ seg as just discussed. Meanwhile the melodic pitch $D5$ hangs overhead, awaiting its completion, which (3) turns out to be an overlapping *Transposition* of the subsection’s opening $\langle D, E, F, D \rangle$ seg. Under this melodic *T*-relation, the accompaniment *Inverts* its opening $\langle F, E, D \rangle$ p-seg to $\langle D, E, F \rangle$ at the same pulse level (TS basic dur $^1/4$), defining a quasi-palindrome stretching from m. 8 to the middle of m. 13.

Second, in mm. 11-14, melodic pseg $\langle E, F, D, E \rangle$, bounded by lengthy melodic rests in mm. 11 and 14, articulates palindromic idur-seg $\langle ^2/3, ^1/3, ^2/3 \rangle$. This melodic symmetry coincides with quasi-palindromic accompaniment pitch material ($\langle D, E, F \rangle$ flanked by

³⁸ Within the $\{D, E, F\}$ pc universe, accompaniment p-seg $\langle F, E, D, F \rangle$ also *Inverts* melody p-seg $\langle D, E, F, D \rangle$.

³⁹ The pitch Inversion in question occurs within the pc universe $\{D, E, F\}$.

<A,G> and <G,A>). The melodic E in m. 13, however, also belongs with the <E,F,G> to come, and this allegiance launches a whole new series of symmetries.

Such palindromes emerge from a fluid combination of parallel and palindromic structures in pitch and time, and in melody and accompaniment. In these cases the accompaniment controls the quasi-palindromes; in others the melody takes the lead. Thus, contrary to Gann's claim that melody and accompaniment "seem completely independent as to rhythm," the lines actually dance together—now one line taking the lead, now the other—to form overall symmetric structures from a multi-faceted choreography of parallel and palindromic structures.

The dance changes in section 2 to an off-kilter rag. Section 2 hints at or forthrightly presents classic rag features: straightforward harmonic progressions, duple meter, 16-bar strains, syncopated melody, "oom-pah" accompaniment, and piano medium.⁴⁰

It does not completely forget the tango, however. The accompaniment's ragtime duple "oom-pah" (bass notes versus higher-register thirds) plays against a tango-derived triple idur-seg. As mentioned earlier, the historical development of rhythmic complexity in the stylized tango included the derivation of idur-seg <3,3,2> from the standard <3,1,2,2>. Example 13 shows that the accompaniment of *Tango?*'s section 2 articulates the idur pattern <³/₆,³/₆,x>, <³/₅,³/₅,x>, <³/₆,³/₆,x>, ..., where $x \leq \frac{2}{5}$. I interpret this idur pattern as a skewed <3,3,2?> idur-seg (TS basic durs) alternating between two tempi (6 pulses per measure, and 5 pulses per measure).⁴¹

The section's accompaniment seems to be independent of its melody. However, accompanimental pitch and rhythmic structure actually supports and emphasizes melodic structure. Moving from

⁴⁰ Barry Kernfield, "Ragtime," in *The New Harvard Dictionary of Music* (1986): 680 lists all six of these characteristics as typical of rags. He also notes that ragtime owed its popularity in part to piano rolls—Nancarrow's medium of choice for the greater part of his compositional career.

⁴¹ This <3,3,2?> seg expresses *Tango?*'s basic relationships—seg <2,1> and ratio 2:3—in new ways. It represents two occurrences of one duration (³/₆ or ³/₅) followed by one occurrence of a lesser duration. The ratios of its durations are 3:2?. And it sets 3-element idur-segs against 2-element ("oom-pah") pitch contours.

the large to the small, I will demonstrate how melody and accompaniment dance together.

Example 13. Tango?. Section 2 accompaniment (beginning).

idurs $\frac{3}{5}$ $\frac{3}{5}$ x $\frac{3}{5}$ $\frac{3}{5}$ x $\frac{3}{5}$ $\frac{3}{5}$ x $\frac{3}{5}$ ($x \leq \frac{2}{5}$)

< 3 3 2? > < 3 3 2? > < 3 3 2? > < 3

Example 14 lists the accompaniment's idur segs in order, along with the total idur for each seg,⁴² and locates the segs in relation to the melody's core, extension, and tail. Example 15 displays the corresponding score.

As shown in Example 14, segments of accompaniment segs form a quasi-palindromic structure—a club sandwich of idur-segs. P, P', and P'' occur at the beginning, middle, and end, sandwiching layers of S and Q.⁴³

The top part of the accompaniment club sandwich (<P,S,Q,P'>) demarcates the melodic core exactly. As melody and accompaniment complete this unit together, the melody takes the lead in forming another symmetry: the ABA form defined by the repetition of core idurs in the extension (compare to Example 6). This melodic quasi-palindrome as a whole does not align with accompaniment structure. The accompaniment, in the meantime, inserts new idur material (W), before supplying the bottom portion of the club sandwich (<...S',Q,P''>) and completing the large quasi-palindrome spanning the entire section. The section as a whole thus demonstrates the basic and now familiar choreography of the melody-accompaniment duo: <palindromic unit together,

⁴² The last idur in the example, $\frac{2}{5}$, is measured to the onset of the next section.

⁴³ P' extends P by repeating its middle seg < $\frac{3}{5}$, $\frac{3}{5}$, $\frac{2}{5}$ > at its end; P'' truncates P by deleting its last seg.

Example 14. Tango?. Section 2. Accompaniment idurs.

MELODY		ACCOMPANIMENT		
<u>m.</u>	<u>part</u>	<u>idur-segs</u>	<u>total idur</u>	
59	core	$\langle \frac{3}{6}, \frac{3}{6}, \frac{7}{30} \rangle$	$1\frac{7}{30}$	P
		$\langle \frac{3}{5}, \frac{3}{5}, \frac{2}{5} \rangle$	$1\frac{3}{5}$	
		$\langle \frac{3}{6}, \frac{3}{6}, \frac{2}{5} \rangle$	$1\frac{2}{5}$	
		$\langle \frac{3}{5}, \frac{3}{5}, \frac{3}{5}, \frac{3}{10} \rangle$	$2\frac{1}{10}$	S
		$\langle \frac{3}{6}, \frac{3}{6}, \frac{3}{10} \rangle$	$1\frac{3}{10}$	
		$\langle \frac{3}{5}, \frac{3}{5}, \frac{1}{3} \rangle$	$1\frac{8}{15}$	Q
		$\langle \frac{3}{6}, \frac{3}{6}, \frac{4}{15} \rangle$	$1\frac{4}{15}$	
		$\langle \frac{3}{5}, \frac{3}{5}, \frac{11}{30} \rangle$	$1\frac{17}{30}$	
		$\langle \frac{3}{6}, \frac{3}{6}, \frac{7}{30} \rangle$	$1\frac{7}{30}$	
		$\langle \frac{3}{5}, \frac{3}{5}, \frac{2}{5} \rangle$	$1\frac{3}{5}$	P'
		$\langle \frac{3}{6}, \frac{3}{6}, \frac{2}{5} \rangle$	$1\frac{2}{5}$	
		$\langle \frac{3}{5}, \frac{3}{5}, \frac{2}{5} \rangle$	$1\frac{3}{5}$	
		$\langle \frac{3}{6}, \frac{3}{6}, \frac{1}{5} \rangle$	$1\frac{1}{5}$	
		$\langle \frac{3}{5}, \frac{3}{5}, \frac{4}{15} \rangle$	$1\frac{7}{15}$	W
		$\langle \frac{3}{6}, \frac{3}{6}, \frac{1}{3} \rangle$	$1\frac{1}{3}$	
		$\langle \frac{3}{5}, \frac{3}{5}, \frac{3}{10} \rangle$	$1\frac{1}{2}$	S'
	$\langle \frac{3}{6}, \frac{3}{6}, \frac{3}{10} \rangle$	$1\frac{3}{10}$		
77	extension	$\langle \frac{3}{5}, \frac{3}{5}, \frac{1}{3} \rangle$	$1\frac{8}{15}$	Q
		$\langle \frac{3}{6}, \frac{3}{6}, \frac{4}{15} \rangle$	$1\frac{4}{15}$	
		$\langle \frac{3}{5}, \frac{3}{5}, \frac{11}{30} \rangle$	$1\frac{17}{30}$	
		$\langle \frac{3}{6}, \frac{3}{6}, \frac{7}{30} \rangle$	$1\frac{7}{30}$	
		$\langle \frac{3}{5}, \frac{3}{5}, \frac{2}{5} \rangle$	$1\frac{3}{5}$	
		$\langle \frac{3}{5}, \frac{3}{5}, \frac{2}{5} \rangle$	$1\frac{3}{5}$	P''
84	tail			

Example 15. Tango? Section 2.

A **B**

CORE

59 $\frac{1}{4}$ $\frac{2}{4}$ $\frac{3}{4}$ $\frac{2}{4}$ $\frac{1}{4}$ $\frac{2}{4}$ $\frac{5}{4}$ $\frac{1}{4}$ $\frac{2}{4}$ $\frac{3}{4}$ $\frac{1}{4}$ $\frac{2}{4}$ $\frac{3}{4}$ $\frac{1}{4}$ $\frac{2}{4}$ $\frac{3}{4}$

mp $\frac{3}{16}$ $\frac{3}{5}$ $\frac{7}{30}$ $\frac{3}{5}$ $\frac{2}{5}$ $\frac{3}{5}$ $\frac{3}{10}$ $\frac{3}{5}$ $\frac{2}{5}$ $\frac{3}{10}$ $\frac{3}{5}$ $\frac{3}{10}$ $\frac{3}{5}$ $\frac{3}{10}$ $\frac{3}{5}$ $\frac{3}{10}$

P **S** **Q**

B (cont.)

67 $\frac{6}{4}$ $\frac{2}{4}$ $\frac{1}{4}$ $\frac{2}{4}$ $\frac{3}{4}$ $\frac{2}{4}$ $\frac{1}{4}$ $\frac{2}{4}$ $\frac{1}{4}$ $\frac{2}{4}$ $\frac{1}{4}$ $\frac{2}{4}$ $\frac{1}{4}$ $\frac{2}{4}$ $\frac{1}{4}$ $\frac{2}{4}$ $\frac{3}{4}$

false recap— alternation—

$\frac{3}{5}$ $\frac{1}{5}$ $\frac{3}{5}$ $\frac{3}{10}$ $\frac{4}{15}$ $\frac{3}{5}$ $\frac{3}{5}$ $\frac{1}{10}$ $\frac{3}{5}$ $\frac{3}{5}$ $\frac{3}{10}$ $\frac{3}{5}$ $\frac{3}{10}$ $\frac{3}{5}$ $\frac{3}{10}$ $\frac{3}{5}$ $\frac{3}{10}$

wedge—

Q (cont.) **P'**

Example 15 (continued). Tango?. Section 2.

B (cont.) **A** **EXTENSION**

75

7/4 2 1/4 1/4 3/4 5/4 2/4 1/4 3/5 3/6 1/5 3/10 3/4

P' (cont.) **S'** **Q**

A (cont.)

TAIL
3/4 3/4 2/4

SECTION 3

91

mf

Q (cont.)

P

one partner extends the palindrome, the other follows to create an overarching palindrome>.

A closer look at the choreography illuminates the shifting interactions of melody and accompaniment, and the roles played by segs A, B, P, S, Q, and W. I begin by reexamining my earlier contention that *Tango's* meter signatures coordinate tempi rather than indicating meter. In this section, as shown in Example 15, various features conspire to articulate a sounding—if odd and oft-contradicted—duple meter. The notated 4/8 meter in the melody and 6/8 in one accompaniment strand allow for the possibility of duple meter.⁴⁴ Pitch-rhythmic structure in the melody facilitates a syncopated duple hearing, while “oom-pah” pitch structure (and occasionally its metric placement) in the accompaniment supports the duple feel.

The section's opening persuades the listener of its dupleness as follows. The accompaniment begins with a clear “pah-oom” articulation of the measure—late by $\frac{1}{6}$. This misalignment rights itself by m. 61, and the remainder of accompaniment segs P and S in mm. 61-64 clearly articulate downbeats and duple-ish metric structure. Straightforward quarter-note pulses surface in m. 62, momentarily orienting the listener to the section's prototypical 2/4 meter. One has the sense of the melody beginning confidently in 2/4 meter; the accompaniment entering nonchalantly late, catching up with a skip in m. 61, playing the good 2/4 citizen in m. 62, and then becoming progressively more rebellious through mm. 63-65.⁴⁵

Nancarrow uses accompaniment seg S to emphasize certain harmonic and melodic events. Seg S breaks the <3,3,2> accompanimental mold, inserting an extra idur: $\langle \frac{3}{5}, \frac{3}{5}, \frac{3}{5}, \frac{3}{10} \rangle$ instead of $\langle \frac{3}{5}, \frac{3}{5}, \frac{3}{10} \rangle$. The extra idur delays the expected short idur $\frac{3}{10}$, and this palpable delay spotlights the short idur's landing on the D2 of m. 65. This D2 begins a cadential progression in melody and accompaniment, initiating an accompanimental chromatic ascent to a V-I cadence in A major in mm. 67-68, and a melodic progression to idur $\frac{6}{4}$, the longest idur until the end of the

⁴⁴ Potential duple meters in both melody and accompaniment occur in only two other sections, 4 and 5; see Example 7c.

⁴⁵ The melody keeps the listener on track by repeating idurs $\langle \frac{1}{4}, \frac{2}{4}, \frac{3}{4} \rangle$ every two measures (at mm. 59, 61, and 63).

The section's main formal event—the arrival of the melodic extension—occurs at m. 77. Melody and accompaniment collude to set up this moment. First, after the A-major cadence in m. 68, the melody presents a false recapitulation of opening melodic idurs $\langle 1/4, 2/4, 3/4, 2/4, 1/4, 2/4 \rangle$. This false recapitulation presages the true idur recapitulation which will begin at the extension. It also gives rise to an extended alternation of idurs $2/4$ and $1/4$ leading to idur $7/4$, the section's longest idur, and the end of the core.⁴⁶ Second, as seen in Example 16, the accompaniment carries the listener to the extension via a stepwise pitch wedge that extends from the accompaniment's lowest pitch G2 (m. 72) to the E2 at the beginning of the extension (m. 77).

72 EXTENSION 77

Note, however, that melodic and accompanimental processes in the passage occur askew: the melodic $\langle 2/4, 1/4 \rangle$ idur alternation begins in m. 70 and ends in m. 74, while the accompaniment pitch wedge spans mm. 72-77. Moreover, melody and accompaniment contradict one another metrically: the melody establishes a clear $3/4$ -

⁴⁶ In terms of TS basic durs, $7/4$ is also the longest idur of the piece, except for idur $8/5$, which marks the end of section 6 and the beginning of the climactic final section. (See Example 6.)

idur periodicity (akin to $3/8$ meter), while the accompaniment fortifies its duple meter.

We can see this fortification of duple meter most clearly by comparing accompaniment idur-segs P and P'. Seg P' begins just after the start of the melodic $\langle 2/4, 1/4 \rangle$ idur alternation, and just before the beginning of the accompaniment pitch wedge. Although it duplicates the metric placement of opening idur-seg P exactly, its registral orientation has shifted: it "oom-pahs" rather than "pah-ooms." Furthermore, seg P' extends P in order to reach the core-extension boundary, and in so doing increases the number of articulated downbeats to four (as with opening segs P and S combined). Both of these changes strengthen the duple metric stability of seg P'.

The accompaniment's intensified dupleness is masked, however, by the melody's $\langle 2/4, 1/4 \rangle$ idur alternation. Only when the melody pauses on the $7/4$ idur can the accompaniment dupleness come to the fore, and guide the listener to the clear $2/4$ measure that begins the extension. The skewed alignment of melody and accompaniment thus lends particular force to the drive to the extension.

Just as melody and accompaniment collaborate in moving towards the extension, so too do they cooperate in marking its arrival. As soon as the extension's hard-won $2/4$ measure is gained, the accompaniment immediately upsets it with $1/5$, its shortest idur.⁴⁷ The short idur is particularly surprising in context: the immediately-preceding idur-seg, $\langle 3/5, 3/5, 2/5 \rangle$, which ends the core, is the accompaniment's *longest* seg, while the seg in question, $\langle 3/6, 3/6, 1/5 \rangle$, which begins the extension, is its *shortest* seg.⁴⁸ The juxtaposition of longest and shortest accompaniment segs, longest melodic and shortest accompaniment idurs (mm. 74-76, 78), definite but jilted $2/4$ meter, and returning melodic idur-seg A and new accompaniment idur-seg W—in other words, melody and

⁴⁷ Although the extension recapitulates the core's melodic idurs, the two passages begin with contrasting metrical progressions: the core gradually establishes $2/4$ meter (mm. 59-62), while the extension enters with a forthright $2/4$ and immediately disrupts it.

⁴⁸ $\langle 3/5, 3/5, 2/5 \rangle$ occurs only four times in the section. As shown in Example 14 (in bold) the seg marks boundaries: it "begins" and ends the entire section, as well as ending the core.

accompaniment *in close collaboration*—clearly marks this significant juncture.

Melody and accompaniment continue to cooperate in the remainder of the section. Example 17 shows the bottom part of the accompaniment club sandwich <...S',Q,P">. I will begin with the passage spanned by accompaniment seg Q. Here the melody, for the first time, segments consistently into three-dyad segs that align roughly with the accompaniment's tango <3,3,2?> idur-segs; from m. 83 to m. 86, each melodic attack closely precedes, or aligns with, a single accompaniment attack. As shown by the $\frac{3}{4}$ -idur pulses under the melodic staff, the melody strongly suggests $\frac{3}{8}$ meter, departing from the duple ragtime feel that dominates the section.

The passage unfolds both parallel and palindromic structures. Beginning at Q, the melody expresses two statements of idur-seg < $\frac{3}{4}, \frac{1}{4}, \frac{2}{4}$ > (*T-related*), whose pitch-contour segs <2,0,1> and <1,2,0> are RI-related (that is, *related by I and J*).⁴⁹ This little parallel/palindromic structure hinges the melodic extension to the tail. In mm. 85-86 the symmetry extends: melodic idur-seg < $\frac{2}{4}, \frac{1}{4}, \frac{3}{4}$ > and pitch-contour seg <0,2,1> *Invert* the preceding segs, while the accompaniment returns to the tempo ($\frac{1}{6}$) with which it began Q. Measure 87 further extends the process and brings it to a temporary halt. The melody arrives at its longest tail idur, while harmonic events (accompaniment <E2, F#3-A3> and melodic {A4,C#5}) refer back to the beginning of Q (m. 83).⁵⁰ The entire sequence—(1) a small melodic quasi-palindrome (mm. 82-85), (2) an extension via *Inversion* to m. 86, (3) a further extension to the long melodic idur and harmonic return in m. 87—spans accompaniment seg Q and, as with earlier Q material, suggests A major. This sequence is the first dance step: quasi-palindromic unit in melody and accompaniment together.

As before, the last melodic attack in this unit groups both backwards and forwards. {A,C#} in m. 87 groups with preceding material because of the long idur separating it from following melodic attacks, yet also belongs with following material because of the pattern of melodic 3-dyad segs separated by rests. Its length,

⁴⁹ The contours in pitch (<2,0,1>) and idurs (< $\frac{3}{4}, \frac{1}{4}, \frac{2}{4}$ >) are isomorphic.

⁵⁰ In m.83 the melody pitches are {C#4, A4}.

idur $\frac{4}{4}$, disrupts the preceding $\frac{3}{8}$ melodic meter and 1-to-1 alignment of melody-accompaniment attacks, signaling a unit boundary.

Following material, which spans accompaniment idur-seg P'', brings back two aspects of S' material from mm. 81-82: duple-ish meter and G-major orientation.⁵¹ As mentioned earlier, duple-ish meter dominates the section as a whole. Every notated downbeat sounds, with at most one downbeat omitted at a time, and at least four articulated downbeats between omitted ones. As $\frac{3}{8}$ meter emerges in m. 82ff., however, articulated downbeats become scarce: the tail expresses only two of its seven notated downbeats. In P'' material in m. 88ff., melody and accompaniment edge their way back to duple-ness, finally arriving at a downbeat in the section's final measure.

This downbeat coincides with the arrival of V in a G-major I-ii-V $\frac{4}{4}$ -I cadential progression. This progression, too, recalls the S' passage, which articulated V-I in G major. On a larger scale, except for one note, the accompaniment pitches of mm. 87-90 *Invert* those of mm. 81-83. (See the brackets and circled numbers under the staff.) This larger pitch palindrome spans the entire bottom portion of the accompaniment club sandwich (<S', Q, P''>), and the melodic material following the longest post-core melodic idur ($\frac{5}{4}$). In retrospect it also brings out the I- and I-relations between p-contour and melodic idur-segs in mm. 81-82 (obscured by slurs) and following melodic segs. In other words, the passage in Example 17 once again exemplifies the series of dance steps <palindrome together, one partner extends, the other completes>: (1) a melodic-harmonic quasi-palindrome spans Q; (2) at the end of Q, melodic {A, C♯} awaits the remainder of its 3-element seg; and (3) the accompaniment completes a large harmonic palindrome spanning <S', Q, P''>.

A performer might conceive of the entire hybrid ragtime-tango section shown in Example 15 as follows. The section opens with the establishment of $\frac{2}{4}$ meter (during the course of P material), marks a cadential approach beginning at Q with the extra idur of

⁵¹ Accompaniment idur-seg S' normalizes "extra-long" seg S by omitting its extra idur. Presumably Nancarrow found the extra-idur surprise superfluous so soon after the jolt of shortest idur $\frac{1}{4}$.

Example 17. Tango?. Section 2 end.

idur $\frac{5}{4}$ $\frac{1}{4} < \frac{2}{4}$ $\frac{1}{4}$ $\frac{3}{4} >$ $\frac{1}{4}$ $\frac{1}{4} < \frac{3}{4}$ $\frac{1}{4}$ $\frac{3}{4} >$ $\frac{1}{4}$ $\frac{2}{4} >$ $\frac{1}{4}$ $\frac{2}{4} >$ $\frac{1}{4}$ $\frac{3}{4} >$ $\frac{1}{4}$

p-contour < 0 2 $1 >$ < 2 0 $1 >$ < 1 2 $0 >$ < 0 2 $1 >$

... EXTENSION TAIL

87 84

pulse $\frac{3}{4}$

pitch

① ② ③ ④ ⑤

88

P''

② I ①

" I ii_5^6 V_4^6 $\frac{5}{3}$ "

seg S, and cadences momentarily in A major. The cadence launches an apparent recapitulation of opening melodic idurs, but these lead only to an alternation of $\langle 2/4, 1/4 \rangle$ idurs. As the melody feints around the apparent recapitulation, the accompaniment, too, brings back its opening idurs, now bolstered by a true “oom-pah” registral orientation and stepwise pitch wedge. The building tension of the melodic $\langle 2/4, 1/4 \rangle$ repetition, and of the accompanimental increasingly-duple pitch wedge, culminates in the extension’s true recapitulation of opening melodic idurs, and in its *bona fide* 2/4 measure (m. 77).

Immediately after this measure, however, the accompaniment elbows in with shortest idur $1/5$, upsetting the hard-won 2/4 meter, and shedding new light on the melodic idur recapitulation. That new perspective proves appropriate at the return of accompaniment $\langle \dots S, Q, P \rangle$ material, which also transforms its context: S' , now a well-behaved duple-ish V-I in G major, precedes tumbling 3/8-ish patterns in A major (Q), that only gradually come to order with the return of G major and dupleness (P''). The entire $\langle S', Q, P'' \rangle$ sequence finds closure in its underlying harmonic palindrome.



Far from being unrelated to one another, *Tango?*’s melody and accompaniment interact to create ever-shifting parallel and palindromic structures. Using the tools defined here of fractional durations, and of temporal *Transposition* and *Inversion*, I have shown how *Tango?*’s lines in multiple concurrent tempi work together to create kaleidoscopic parallel and palindromic structures, and to reference quirky versions of tango and ragtime characteristics. In particular, I have demonstrated that a basic process—quasi-palindrome together, accompaniment extends while melody hangs above, melody continues and accompaniment completes larger quasi-palindrome—underlies the choreography on which *Tango?* is built. I have illustrated the essentially “diatonic” nature of both pitch and rhythmic materials, in both parameters’ reliance upon sets {1,2}, {2,3}, and {5,7}, as well as in specific tonal implications. Finally, I hope to have demonstrated a way of conceptualizing the interaction of melody and accompaniment that may be useful to performers of the work.