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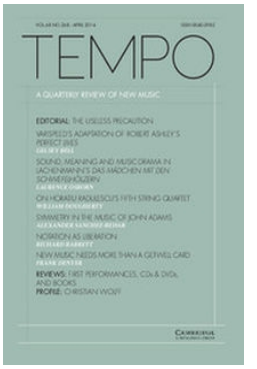

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Alexander Sanchez-Behar

Tempo / Volume 68 / Issue 268 / April 2014, pp 46 - 60
DOI: 10.1017/S0040298213001678, Published online: 20 March 2014

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How to cite this article:
Alexander Sanchez-Behar (2014). SYMMETRY IN THE MUSIC OF JOHN ADAMS. Tempo, 68, pp 46-60 doi:10.1017/S0040298213001678

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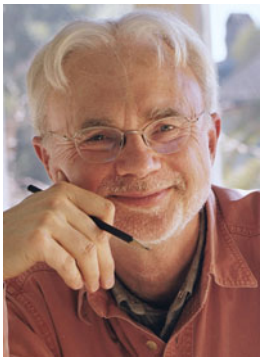
doi:10.1017/S0040298213001678

SYMMETRY IN THE MUSIC OF JOHN ADAMS

Alexander Sanchez-Behar

Abstract: Close examination of John Adams's oeuvre reveals that symmetry is one of the predominant features of his music. Three common types of symmetry are encountered in Adams's works: reflection, translation and rotation. This article investigates these symmetries and tracks their development throughout Adams's compositional career. An analysis of selected works from the 1970s (*China Gates* and *Phrygian Gates*), 1980s (*Grand Pianola Music* and *Fearful Symmetries*) and 1990s (the Violin Concerto and *Century Rolls*) highlights the most pervasive symmetry in each decade and shows a shift from preconceived overarching symmetries that frame entire musical structures to smaller-level symmetries that affect the music at a level of phrase and motivic structure.



John Adams (photo by Margaretta Mitchell)

Introduction

Over the course of his compositional career, John Adams has developed a penchant for engaging symmetrical processes that contribute to his own brand of minimalism. Adams's method for employing symmetry originates in the late 1970s, with works such as *China Gates* (1977) and *Phrygian Gates* (1977–78), both of which are considered by Adams and scholars of his music to be his first mature works. These pieces subject formal structure and pitch content to symmetrical processes at various levels. Adams's focus on symmetry continues in the 1980s, with works like *Grand Pianola Music* (1982) and *Fearful Symmetries* (1988). In this period, he begins to loosen the strictures of all-encompassing symmetrical structures. Since the 1990s Adams has redefined his notion of symmetry by borrowing and emulating melodic materials derived from Nicolas Slonimsky's *Thesaurus of Scales and Melodic Patterns* (1947).[1]

[1] Nicolas Slonimsky, *Thesaurus of Scales and Melodic Patterns* (New York: Charles Scribner's Sons, 1947).

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In this article, I will detail three kinds of symmetries found in Adams's works: reflection, translation and rotation.[2] While these symmetries transform music in divergent ways, their common trait entails the transformation of an object, which preserves its original condition in size and shape relative to an axis point.[3] Reflection symmetry is synonymous with mirror symmetry across an axis; translation considers the repetition of an object at periodic intervals; and rotation changes the orientation of an object by shifting it around a fixed rotational axis point. To gain a clearer insight into Adams's ever-evolving compositional style, I will explore the aforementioned instrumental works, and highlight the ways in which his trajectory from an early minimalist composer – producing formal structures that prioritize direct audible processes – to a more intuitive post-minimalist composer, is affected by notions of symmetry.

China Gates (1977)

Adams's use of symmetry in *China Gates* permeates the whole work at multiple levels of structure. The overall design of *China Gates* can be depicted with a geometric construct known as a hyperboloid, which resembles an hourglass shape.[4] In Figure 1, I transform a hyperboloid into a discrete geometric shape of stacked rectangles to mark the formal sections of this work. Musical sections are delineated by sudden modal shifts, and the emergence of a new pedal tone that projects a tonic for each modal centre.[5] Adams borrows the term *gating* from electronics, to describe 'moments when the modes abruptly and without warning shift'.[6] Adams described *China Gates* as a piece that calls for attention to 'details of dark, light, and the shadows that exist between'.[7] The Mixolydian and Lydian modes, both close to the major scale, are associated with light sections, and the Aeolian and Locrian modes, close to the minor scale, with dark sections.[8] Modal sections in the upper cone exhibit a diminishing 4:3:2:1 ratio of proportions, and reverse the order for the lower cone. Counting the sum of crotchets from the upper and lower cones yields a value of 600. Coincidentally, in the Greek numeral system, the letter chi ('X') – essentially the basic skeleton of a hyperboloid – also contains

[2] Candace Brower investigates these types of symmetries in her 'Paradoxes of Pitch Space', *Music Analysis*, 27, no. 1 (2008), pp. 51–106.

[3] Various authors have described symmetry in this manner. See Hermann Weyl, *Symmetry* (Princeton: Princeton University Press, 1952) and György Darvas, *Symmetry: Cultural-Historical and Ontological Aspects of Science-Arts Relations* (Basel: Birkhäuser, 2007).

[4] The application of a hyperboloid stems from Daniel J. McConnell's analysis of *China Gates*: 'John Adams's Perpetual Motion Machine', unpublished paper presented at the Society for Music Theory Annual Meeting (Boston, 2005).

[5] My designation of modes, which concurs with Daniel J. McConnell's analysis, is based on a low pedal note that signals the opening of each section. This interpretation also accords with Timothy A. Johnson's preference rules specifically designed for analyzing modes and chords in Adams's music. See his 'Harmonic Vocabulary in the Music of John Adams: A Hierarchical Approach', *Journal of Music Theory*, 37, no. 1 (1993), pp. 117–56, esp. p. 130.

[6] John Adams, 'China Gates', http://www.earbox.com/piano-solo-or-duet/china-gates (accessed 2 October 2013).

[7] Adams, 'China Gates'.

[8] While McConnell's geometric depiction is compelling, and his modal designation of formal sections is accurate, his analysis overlooks other symmetries that interact with the hyperboloid structure. For instance, McConnell's shadings in the lower cone do not reflect those of the upper cone. Furthermore, McConnell's dark- and light-shaded regions are represented on different rows, while my own hyperboloid reinterprets these regions on the same horizontal plane to associate another aspect of this work's symmetry I will soon detail.

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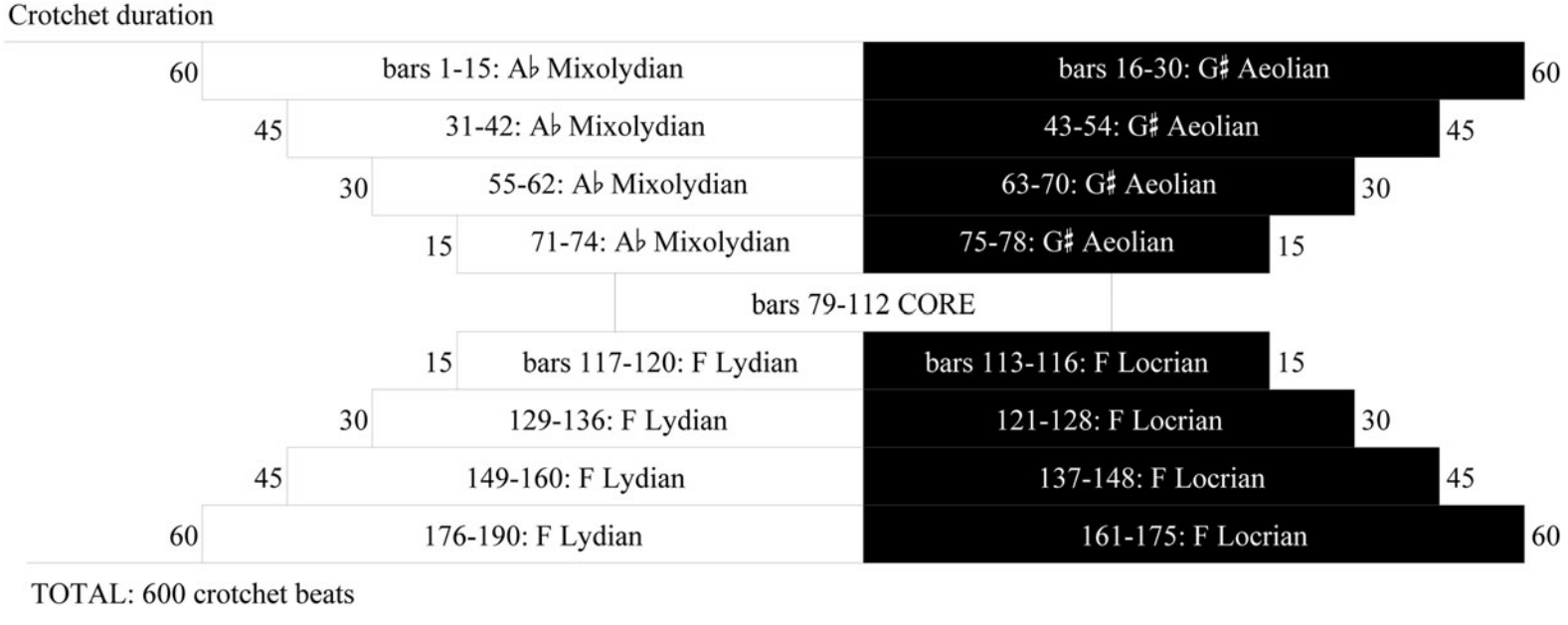

Figure 1: Geometric Hyperboloid Representation of *China Gates*

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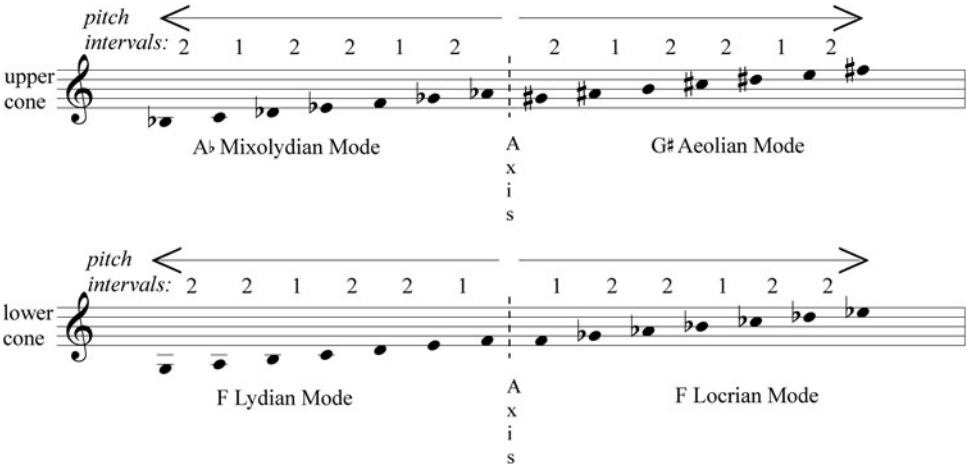

Figure 2:
Symmetrical Modes in Upper and Lower Cones

a value of 600. Further presence of Greek thought appears in the application of modes. The hyperboloid's axis point resides in the core's centre. Closer inspection of the core and its axis lies outside the scope of this study due to the apparent breaking of symmetry; nevertheless, its influence throughout the work affects modal and motivic content and the interaction of ostinati in the core.

The symmetrical properties of hyperboloids comprise reflection between upper and lower cones and rotational symmetry about an infinite number of points, a quality also shared by cones. Reflection in music entails the mirroring of a shape about an axis of symmetry such that its respective points and those from its reflection are equidistant to the axis, albeit in reversed directions.[9] This kind of symmetry associates proportional relations (having two equal halves in the hyperboloid), but it also accounts for more direct musical operations such as inversion and retrograde. Rotation moves a shape by a point axis of rotation at an angle of $360°/n$, where n represents a natural number.[10] Adams explores reflectional symmetry in a core section and its epicentre acting as the horizontal axis; in place of rotational symmetry, he derives another type of reflectional symmetry through a vertical axis that transforms major modes into minor ones using inversional operations.

The first type of inversional symmetry in *China Gates* considers the relation between adjacent modes in the upper and lower cones of the hyperboloid. In Figure 2, I compare the intervallic structure of the modes from the upper and lower cones of my diagram, respectively. The major-like modes appear on the left side and are read from right to left, starting from the axis point, while the minor-like modes appear on the right, in their normal ascending order. Counting the number of semitones from the axis shows the same intervallic distances between major and minor corresponding modes, revealing inversional symmetry. Adams disguises the symmetry by evading straightforward scalar iterations. Instead, he moulds ostinato patterns of various lengths that transform gradually and shape the entire work.

[9] György Darvas, *Symmetry*, p. 4.
[10] Darvas, *Symmetry*, pp. 4–5.

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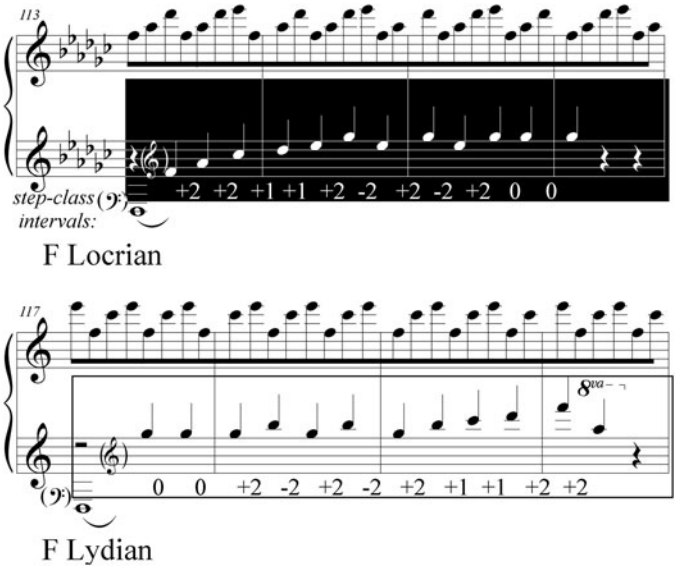

Figure 3:
Step-class retrograde inversions across gate changes, in Adams, *China Gates*. CHINA GATES, by John Adams. © 1983 by Associated Music Publishers, Inc. (BMI). International Copyright Secured. All Rights Reserved. Used by Permission.

The reiterating fragments from the left-hand textures in *China Gates* comprise yet another instance of symmetry.[11] These repetitive patterns generate a mirror counterpart that is transformed at each gate. The symmetrical relationship of the realised patterns in the black and white formal sections is illustrated in Figure 3.[12] This excerpt exhibits the shortest black and white portion in the lower cone of the hyperboloid (bars 113–120). Bars 113–116 derive from the Locrian mode, and bars 117–120 invert the mode to F Lydian. While Adams's right-hand ostinato figures maintain rhythmic momentum and even influence perceived metre, the left-hand musical line is transformed through a retrograde-inversion operation, but with a slight change that engages step-class intervals.[13] A step-class interval is defined as the directed distance in steps between two notes of any given collection.[14] The example, representative of the transformations that occur throughout *China Gates*, reveals how step-class intervals maintain the intervallic identity across the gate change. Both pitch and rhythmic parameters are affected by the retrogression operation, and while rhythm is homogenous in bars 117–120, other sections exhibit rhythmic contrast, making the retrograde component even more discernible. The step-class RI operation retains the letter-name of the last note of the Locrian mode, and it draws on its Lydian inflection to mark the first note from the subsequent section (bars 117–120), a procedure for conversion that holds constant for most of the remaining retrograde-inversion operations. Retrograde-inversional operations can at times yield the same values

[11] Gretchen Horlacher derived the term *reiterating fragment* to describe a repetitive pattern that is similar to an ostinato, except that its iterations can be modified or offset by rest. See her 'The Rhythms of Reiteration: Formal Development in Stravinsky's Ostinati', *Music Theory Spectrum*, 14, no. 2 (1992), pp. 171–87, esp. p. 180.

[12] CHINA GATES, by John Adams. © 1983 by Associated Music Publishers, Inc. (BMI). International Copyright Secured. All Rights Reserved. Used by Permission.

[13] McConnell states that formal sections are related by retrograde-inversion, but he fails to acknowledge step-class transformations.

[14] For a detailed discussion of step-class intervals in analytical literature, see: Christoph Neidhöfer, 'A Theory of Harmony and Voice Leading for the Music of Olivier Messiaen', *Music Theory Spectrum*, 27, no. 1 (2005), pp. 1–34 and Matthew Santa, 'Defining Modular Transformations', *Music Theory Spectrum*, 21, no. 2 (1999), pp. 200–229.

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as standard directed intervals, as it is the case in the upper cone; only in the lower cone does Adams's technique become apparent.

The kinds of symmetries I have found in *China Gates* operate on various levels of structure. First, the modal collections serve as the basic material that links sections through inversional symmetry. Another kind of symmetry that fuses formal sections concerns the transformation of reiterating fragments through step-class retrograde inversions. The modal shifts transpiring at each gate (or axis point) are sudden and provide a means of sectional contrast aided by reflectional symmetry. At the largest level, we can observe mirror symmetry of proportions between the upper and lower cone. All of these symmetries operate on different levels of structure and interact with one another. As Jonathan Bernard states, 'it should be possible, if symmetry is a significant force, to discover a hierarchy of relationships in which smaller symmetries contribute to larger ones, which in turn contribute to even larger ones, and so on, across ever longer spans of time'.[15] From the smallest symmetry to the largest, each revolves around a single reflectional axis that transforms either its modes, motivic patterns or sections.

Phrygian Gates (1977–1978)

In contrast to the delicate textural nuances of *China Gates*, Adams's second piano work *Phrygian Gates* showcases virtuosic 'arches of sound' throughout its four movements.[16] The organising principle of *Phrygian Gates* revolves around the alternation of Lydian and Phrygian modes traversing around half of the circle of fifths, with A Lydian as its point of origin (followed by A Phrygian, E Lydian and E Phrygian, and the process continues until the concluding E♭ Lydian/D♯ Phrygian sections).[17] For Adams the Lydian's 'light, sensual, resonant personality' contrasts directly with the Phrygian's 'volatile, unstable, but often heroic qualities.'[18] This process of modal development runs through the entire work undisturbed even as new movements are initiated: the second movement coincides with the G♭ Lydian opening (bar 402); the third movement, titled 'A System of Weights and Measures', with the C♯ Phrygian opening (bar 640); and the fourth movement with the launch of the A♭ Lydian section (bar 809). What delineates each movement are the stark textural contrasts and the processes that help the work unfold. After reaching a climax at the end of the first movement, through a gradual additive process that increases the number of notes from each chord, the second movement initiates a sparse texture containing ostinato figures. In the third movement, a slow chordal texture appears in contrast to the ostinato figures permeating earlier sections. Catherine Ann Pellegrino interprets the development of the chordal texture as a series of gradually unfolding voice-leading transformations, in which a single tone from each chord descends repeatedly through a cycle of seconds, thirds, fourths or fifths, until the chord

[15] Jonathan Bernard, 'Space and Symmetry in Bartók', *Journal of Music Theory*, 30, no. 2 (1986), p. 192.
[16] John Adams, 'Phrygian Gates', http://www.earbox.com/piano-solo-or-duet/phrygian-gates (accessed 2 October 2013).
[17] John Adams, 'Phrygian Gates'.
[18] John Adams, liner notes to *Phrygian Gates* and *Shaker Loops* (1750 Arch Records S-1784, 1980).

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returns to its original state.[19] It is interesting that Adams begins a palindrome in the fourth movement with A♭ Lydian/G♯ Phrygian, rather than traversing through all the keys in order to reach closure. Pellegrino believes that if closure is to be experienced, it must be anticipated.[20] A complete trajectory through the circle of fifths suggests an end point. But the complete duplication of notes that exists between the opening mode of the first movement, A Lydian, and the first minor-type mode of the fourth movement, G♯ Phrygian, sets the work on a path towards closure. In what is the first instance of mode duplication, the opening notes transform from their light and sensual affective quality to a more unstable and heroic one.

Adams's experimentation with symmetry in *China Gates* has a direct influence on *Phrygian Gates*. Figure 4 demonstrates how the overall structure of the fourth movement (bars 809–1092) can be illustrated using a hyperboloid.[21] The proportional relationship between formal sections decreases in the upper cone by a divisor of two, and reverses the process in the lower cone, which is suggestive of, yet different from, the 4:3:2:1 ratio of *China Gates*. Using crotchet durations, the total span of the upper and lower cones equals 900, a whole number that shares the same multiple of 300 as *China Gates*. Prevailing musical operations between major- and minor-type modes, such as step-class retrograde inversions, are not apparent in *Phrygian Gates*. Furthermore, contiguous modes do not exhibit inversional symmetry. Instead, symmetry in *Phrygian Gates* is experienced at a more grand level of overall form through reflectional symmetry about a horizontal axis point in the central core. Adams's willingness to forgo some of the smaller-level symmetries we encountered in *China Gates* in favour of a single overriding symmetry reflects the collective struggle of early minimalist composers between creating meticulously symmetrical precompositional designs and merging the composer's voice and intuition.[22]

The core section also exhibits reflective symmetry. In Figure 5, I reveal the structure of the core by examining elements of proportion, modes and a central axis. As a matter of preference, the durations of each section are counted using quavers to maintain whole numbers. Considered in its entirety, the duration of the core constitutes precisely a fifth of the upper and lower cones. The individual sections bear

[19] Catherine Ann Pellegrino, 'Aspects of Closure in the Music of John Adams', *Perspectives of New Music*, 40, no.1 (2002), pp. 147–175, here 150–51. The late K. Robert Schwarz also discusses the third movement and draws his analysis from an interview with Adams. See 'Process vs. Intuition in the Recent Works of Steve Reich and John Adams', *American Music* 8, no. 3 (1990), p. 257.

[20] Pellegrino, 'Aspects of Closure in the Music of John Adams', p. 150.

[21] This hyperboloid resembles McConnell's depiction of *China Gates*. Pellegrino also recognises a palindrome in the fourth movement without introducing any geometric representations.

[22] This shift from process-driven works to a more intuitive conception of music is examined by K. Robert Schwarz. See Schwarz, 'Process vs. Intuition in the Recent Works of Steve Reich and John Adams', *American Music*, 8, no. 3 (1990), pp. 245–73. In an interview with Schwarz, Adams said 'I've stopped worrying about whether intuiting a structure is right or not; as far as I can tell, most nineteenth-century composers wrote on intuitive levels' ('Process vs. Intuition', p. 247). There are elements in Adams's work that can be interpreted as efforts to break free from the early minimalist aesthetic that, through a detachment of the composer's voice, generated self-mechanised processes and eventually led to a more personal, intuitive style. According to Schwarz: 'Not only does Adams exploit this modal conflict to create contrasts in melodic patterns, textural density, rhythmic figuration, and dynamics, but he does so with a directionalised motion that sweeps toward climaxes—a motion far removed from the stasis of minimalism. Such a subjective approach works to loosen the bonds of musical process and heighten the role of intuition' (p. 258). The sheer size of *Phrygian Gates* also poses a challenge to maintaining audible symmetrical structures; a primary concern of the early minimalist style was creating gradual, perceptible processes.

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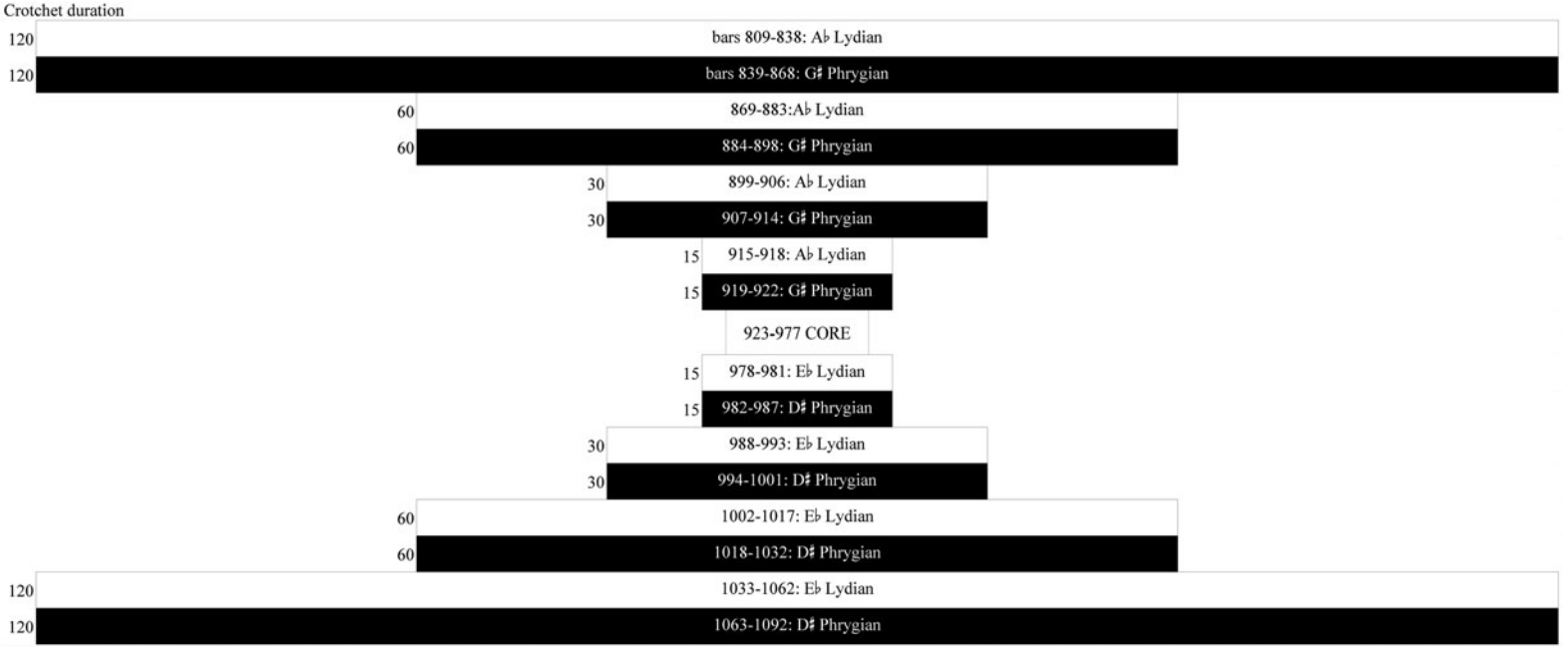

Figure 4: Geometric Hyperboloid Representation of *Phrygian Gates*, fourth movement

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Bars	Total quavers	Modes		
923-925	24	A♭ Lydian		
926-928	24	D♯ Phrygian		
929-931	24	E♭ Lydian		
932-934	24	G♯ Phrygian		
935-936	12	A♭ Lydian		
937-938	12	D♯ Phrygian		
939-940	12	E♭ Lydian		
941-942	12	G♯ Phrygian		
943	6	A♭ Lydian		
944	6	D♯ Phrygian		
945	6	E♭ Lydian		
946	6	G♯ Phrygian		
947	3	A♭ Lydian	E♭-E♭-E♭	Axis Pitch
948	3	D♯ Phrygian	D♯-D♯-D♯	
949	3	E♭ Lydian	E♭-E♭-E♭	
950	3	G♯ Phrygian	D♯-D♯-D♯	
SUBTOTAL	180			
950	3	G♯ Phrygian	D♯-D♯-D♯	
951	3	E♭ Lydian	E♭-E♭-E♭	
952	3	D♯ Phrygian	D♯-D♯-D♯	
953	3	A♭ Lydian	E♭-E♭-E♭	
954	6	G♯ Phrygian		
955	6	E♭ Lydian		
956	6	D♯ Phrygian		
957	6	A♭ Lydian		
958-959	12	G♯ Phrygian		
960-961	12	E♭ Lydian		
962-963	12	D♯ Phrygian		
964-965	12	A♭ Lydian		
966-968	24	G♯ Phrygian		
969-971	24	E♭ Lydian		
972-974	24	D♯ Phrygian		
975-977	24	A♭ Lydian		
TOTAL	360			

Figure 5:
Symmetry in the Core of *Phrygian Gates*, fourth movement

the same kind of proportional relationship as in the macro-structure of the whole, with sections reducing in size by half pointing towards the axis. In other words, the core contains an embedded micro-hyperboloid structure and could easily be depicted as such. The lower micro-cone in bars 950–977 also completes reflective symmetry by reversing the order of modes.

The modes in the core are interposed and in this way their interaction occurs in close succession. The axis point of this fourth

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movement is marked in bars 947–953 with the reiteration of a single note. Adams alternates the spelling of this note enharmonically, E♭/D♯, depending on the mode reinforced in other sections of the core. Although no aural distinction emerges from the enharmonic spelling, the arrival of this note and incessant repetition points to its function as the centre of the movement. A teleological view of the movement might consider the axis point a kind of nucleus since it presents the only note invariant to all four modes from the fourth movement – A♭ Lydian, G♯ Phrygian, E♭ Lydian, and D♯ Phrygian.[23] Writings by Timothy A. Johnson support a notion that the preservation of common tones is integral to understanding Adams's musical style.[24]

Grand Pianola Music (1982) and Fearful Symmetries (1988)

Adams's instrumental works from the 1980s shift away from the pre-compositional constructs witnessed in the gate works, towards an affinity with translational symmetry. This type of symmetry is characterised by the periodic repetition of an object that preserves its full identity in shape and proportion. While composing *Fearful Symmetries*, Adams detected that its harmonic structures unfolded in 'almost maddeningly' symmetrical units.[25] The title stems from a key phrase in William Blake's poem *The Tyger*, but this is the only link to the poem. Adams deliberately embraces repetition in his compositional techniques of this period, as a way of distancing himself from opposing avant-garde styles. Adams elaborates further on his effort to express his distinctive minimalist approach: 'rather than try to deconstruct the obviousness of these harmonic structures, I did the opposite: I amplified their predictability and in so doing ended up composing an insistent pulse-driven juggernaut of a piece'.[26]

In his autobiography, Adams compares the symmetrical nature of *Fearful Symmetries* to the third movement of *Grand Pianola Music* (1982), titled 'On the Dominant Divide'. The textures in this earlier work are more lucid than those of *Fearful Symmetries*. Consider the rhythmic aspect from the principal phrase of 'On the Dominant Divide', shown in Figure 6. Repeated phrases – or phrases that bear nearly the same rhythmic characteristics – dominate much of the dialogue between piano parts (and brass instruments) in bars 104–178. The phrases contain a sentence structure of three sub-phrases followed by a cadence, and are affixed to dominant-tonic or tonic-dominant iterations.[27] Musical

[23] Pellegrino's explanation of the core seems to miss the mark, in my opinion. Rather than acknowledging a certain structure to the modal ordering, she states that 'in m. 923, Adams abandons key signatures and uses accidentals to generate the pitches needed for the modes' ('Aspects of Closure', p. 152). Furthermore, her explanation of the axis point does not explain Adams's preference for using D♯/E♭ over G♯/A♭: 'these measures clearly demonstrate that the focus of the movement is in the alternation between G♯ Lydian and A♭ Phrygian, and the enharmonic equivalence between D♯ and E♭. There is no other reason why Adams would have notated this pitch in two different ways, other than to make this point. The enharmonic equivalence between D♯ and E♭ indicates that there is an underlying conceptual justification for this unusual notation' (p. 153).

[24] See Timothy A. Johnson, 'Harmony in the Music of John Adams: From *Phrygian Gates* to *Nixon in China*' (PhD diss., State University of New York at Buffalo, 1991).

[25] John Adams, *Hallelujah Junction: Composing an American Life* (New York: Farrar, Straus and Giroux, 2008), p. 149.

[26] John Adams, *Hallelujah Junction*, p. 149.

[27] Debra Lee Traficante concurs with the importance of the musical phrases intertwined between pianos: 'Of greatest melodic interest in the entire work is the introduction of a gospel-style melody found in the pianos ... The confidently stated gospel-style melody assists in providing a terraced build-up to the only non-vocable text, "For I have seen the promised land"' ('An Analysis of John Adams' *Grand Pianola Music*', DMA diss., University of Oklahoma, 2010), pp. 108–9).

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	First Subphrase						Second Subphrase						Internal Expansion				Third Subphrase and Cadence						
bars 104-111 (I→V)	1	2	1	3	8		1	2	1	3	5		1	2	1	2	1	2	1	3	2	1	6
113-120 (V→I)	1	2	1	3	5		1	2	1	3	2		1	2	1	2	1	2	1	3	2	1	6
122-129 (I→V)	1	2	1	3	8		1	2	1	3	5		1	2	1	2	1	2	1	3	2	1	6
131-137 (V→I)	1	2	1	3	5		1	2	1	3	2		1	2	1	2	1	2	1	3	2	1	6
139-146 (I→V)	1	2	1	3	5		1	2	1	3	5		1	2	1	2	1	2	1	3	2	1	6
148-153 (V→I)	1	2	1	3	5								1	2	1	2	1	2	1	3	2	1	6
155-162 (I→V)	1	2	1	3	5		1	2	1	3	5		1	2	1	2	1	2	1	3	2	1	6
164-170 (V→I)	1	2	1	3	5		1	2	1	3	2		1	2	1	2	1	2	1	3	2	1	6
172-178 (I→V)	1	2	1	3	5		1	2	1	3	5						1	2	1	3	2	1	6
chord durations	𝅗𝅥	𝅗𝅥	𝅗𝅥	𝅗𝅥.	𝅗𝅥.𝅗𝅥 or 𝅝.𝅗𝅥		𝅗𝅥	𝅗𝅥	𝅗𝅥	𝅗𝅥.	𝅗𝅥 or 𝅗𝅥.𝅗𝅥		𝅗𝅥	𝅗𝅥	𝅗𝅥	𝅗𝅥	𝅗𝅥	𝅗𝅥	𝅗𝅥	𝅗𝅥.	𝅗𝅥	𝅗𝅥	𝅝.

Figure 6: Translational Symmetry in Adams, 'On the Dominant Divide'

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phrases that bear an exact correspondent are said to have maximum translational symmetry, whereas those phrases that generally retain the rhythmic character but either displace one or more rhythms or alter the chordal duration at resting moments feature near symmetry.[28] The incessant level of repetition, emphatic to much minimalist music, directs our perception of rhythmic grouping through translational symmetry.[29]

The symmetrical design of *Fearful Symmetries* also centres on translational symmetry, though the process is not always as apparent as in Adams's works from the early 1980s. Adams's style, like those of other minimalist composers, became increasingly complex during this period. According to Robert Fink, whereas early minimalists lay 'all the cards on the table', the gradual progression of the style led composers to 'keep at least a few [cards] up their sleeves.'[30] One of the ways we experience translational symmetry in *Fearful Symmetries* is tied to the kinds of parsimonious chordal transformations that are pervasive in the work. The recurring Neo-Riemannian *Leittonwechsel* transformation – which makes an incremental change from a major harmony to a minor one by moving the root down a semitone or from a minor harmony to a major one by moving the fifth up a semitone – undulates in predictable two-measure groupings. One of the clearest instances of recurring L-transformations ensues with the quasi-interlude keyboard section Adams highlights with the performance indication to be heard in the foreground (starting in bar 238).[31] The process eventually breaks down, as Adams traverses through some unexpected harmonies, thereby contrasting the high level of symmetry with some asymmetrical moments to create a sense of balance. In Adams's works, the polarising qualities achieved through this balance are germane to his style. According to Weyl, symmetry 'signifies rest and binding, asymmetry motion and loosening, the one order and law, the other arbitrariness and accident, the one formal rigidity and constraint, the other life, play and freedom'.[32] A second, more obvious way symmetry is created from the onset is through the incessant repetition of the bass notes, fluctuating at mostly equal temporal distances between pitch classes G and C♯ in bars 3–32, and then between B♭ and E in bars 33–76. The interval class between each alternating set divides the octave into equal parts, and the combination of these recurring bass notes form a diminished seventh chord, a symmetrical collection that also evenly splits the octave through a cycle of minor thirds. The last type of symmetry in this work concerns the use of the octatonic scale, a resource that yields highly symmetrical materials bearing transpositional (and inversional) symmetry. While the presence of the octatonic scale influences the work from the onset (consider the fully diminished subset), its entrance is transparent in scalar passages from the woodwind section, starting circa bar 582

[28] According to Weyl, near symmetries maintain some components of symmetry, but introduce at least one asymmetrical feature. See Weyl, *Symmetry*, p. 9–11.

[29] Candace Brower, 'Memory and the Perception of Rhythm', *Music Theory Spectrum* 15, no. 1 (1993), pp. 19–35, here p. 28.

[30] Robert Fink, '(Post-)minimalisms 1970–2000: the Search for a New Mainstream', in *The Cambridge History of Twentieth-Century Music*, ed. Nicholas Cook and Anthony Pople (Cambridge: Cambridge University Press, 2004), p. 542.

[31] The employment of Neo-Riemannian connections in this work reveals a keen similarity to Adams's opera *Nixon in China* (1985–87). In Act 1 Scene 2, recurring L-transformations are prominent when Mao Tse-tung calls on his ancestors and makes a declaration that the world has come. See Timothy A. Johnson, *John Adams's Nixon in China: Musical Analysis, Historical and Political Perspectives* (Farnham: Ashgate, 2011), pp. 174–77.

[32] Weyl, *Symmetry*, p. 16.

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and continuing to the end. Thus symmetry is experienced at different levels of structure not tied to large preconceived constructs.

The Violin Concerto (1993) and *Century Rolls* (1996)

Ever since the 1990s, John Adams has openly acknowledged the influence of Slonimsky's *Thesaurus of Scales and Melodic Patterns* on his own compositions.[33] The *Thesaurus* is a reference book that contains over one thousand musical patterns, organised by chapters according to interval cycles they project, as well as ornamentations inserted between cyclic notes.[34] Slonimsky's title suggests that a composer can find musical synonyms that project the same cycle and share the same cardinality and type(s) of embellishments. Slonimsky's patterns hold some notable symmetrical properties, which seem to appeal to Adams's compositional aesthetic and propensity towards integrating symmetrical elements.[35] Nearly all of the patterns are derived from the octatonic collection (set class 8–28), the enneatonic collection (set class 9–12), the hexatonic collection (set class 6–20), the whole-tone collection (set class 6–35) or twelve-tone rows.[36] By and large, the collections found in the *Thesaurus* are transpositionally symmetrical, which can be thought of as a musical representation of translational symmetry that transposes an intervallic pattern on a rising plane.

Because Adams's employment of Slonimsky's patterns is often overt, finding the source of origin can be a straightforward process. Figure 7 illustrates Adams's integration of Slonimsky's Pattern 11, in the first movement of the Violin Concerto, and Pattern 576 in the third movement of the piano concerto *Century Rolls*, 'Hail Bop'.[37] As a norm, Slonimsky shows his cyclical patterns in prime and retrograde form. Borrowing Stephen Heinemann's notation for pitch-class set multiplication, the prime form of Slonimsky's Pattern 11 comprises $\underline{0\text{-}3\text{-}4} \otimes \langle 06 \rangle = 0\text{-}3\text{-}4\text{-}6\text{-}9\text{-}10$, and Pattern 576 $\underline{0\text{-}9} \otimes \langle 02468T \rangle = 0\text{-}9\text{-}2\text{-}11\text{-}4\text{-}1\text{-}6\text{-}3\text{-}8\text{-}5\text{-}10\text{-}7$.[38] Pattern 11 transposes its trichord on a 6-cycle, resulting in the octatonic subset 6-30 [013679], while Pattern 576 transposes its dyad on a 2-cycle, resulting in a twelve-tone row.[39] Pattern 576 has the effect of compound melody by combining a whole-tone scale that commences with pc 0 and its literal complement starting with pc 9.

[33] John Adams, Rebecca Jemian and Anne Marie de Zeeuw, 'An Interview with John Adams', *Perspectives of New Music*, 34, no. 2 (1996), pp. 98–9.

[34] A more thorough examination of Slonimsky's *Thesaurus* appears in Alexander Sanchez-Behar, 'Counterpoint and Polyphony in John Adams's Recent Instrumental Works', PhD diss., (Florida State University, 2008).

[35] Of course, this is not the only reason Adams might have resorted to the *Thesaurus*. Adams and Slonimsky shared a close friendship for many years.

[36] For more information on the enneatonic collection, refer to Kimberly Anne Veenstra, 'The Nine-Step Scale of Alexander Tcherepnin: Its Conception, Its Properties, and Its Use' (PhD diss., Ohio State University, 2009).

[37] Examples from Nicholas Slonimsky, *Thesaurus of Scales and Melodic Patterns* © 1947 (Renewed) Schirmer Trade Books, a division of Music Sales Corporation. International Copyright Secured. All Rights Reserved. Used by Permission. Violin Concerto and Century Rolls by John Adams © Hendon Music, Inc., a Boosey & Hawkes company. Reprinted by permission.

[38] Stephen Heinemann, 'Pitch-Class Set Multiplication in Theory and Practice', *Music Theory Spectrum*, 20, no. 1 (1998), pp. 72–96. Heinemann's multiplication signified by ⊗, transposes the underlined multiplicand series by a cyclic multiplier to yield its union, known as the product. In Pattern 11, for instance, the multiplicand 0-3-4 is transposed to pc 6 giving a product of 0-3-4-6-9-10.

[39] For general information on interval cycles, see Joseph N. Straus, *Introduction to Post-Tonal Theory* (Upper Saddle River: Pearson, 2005).

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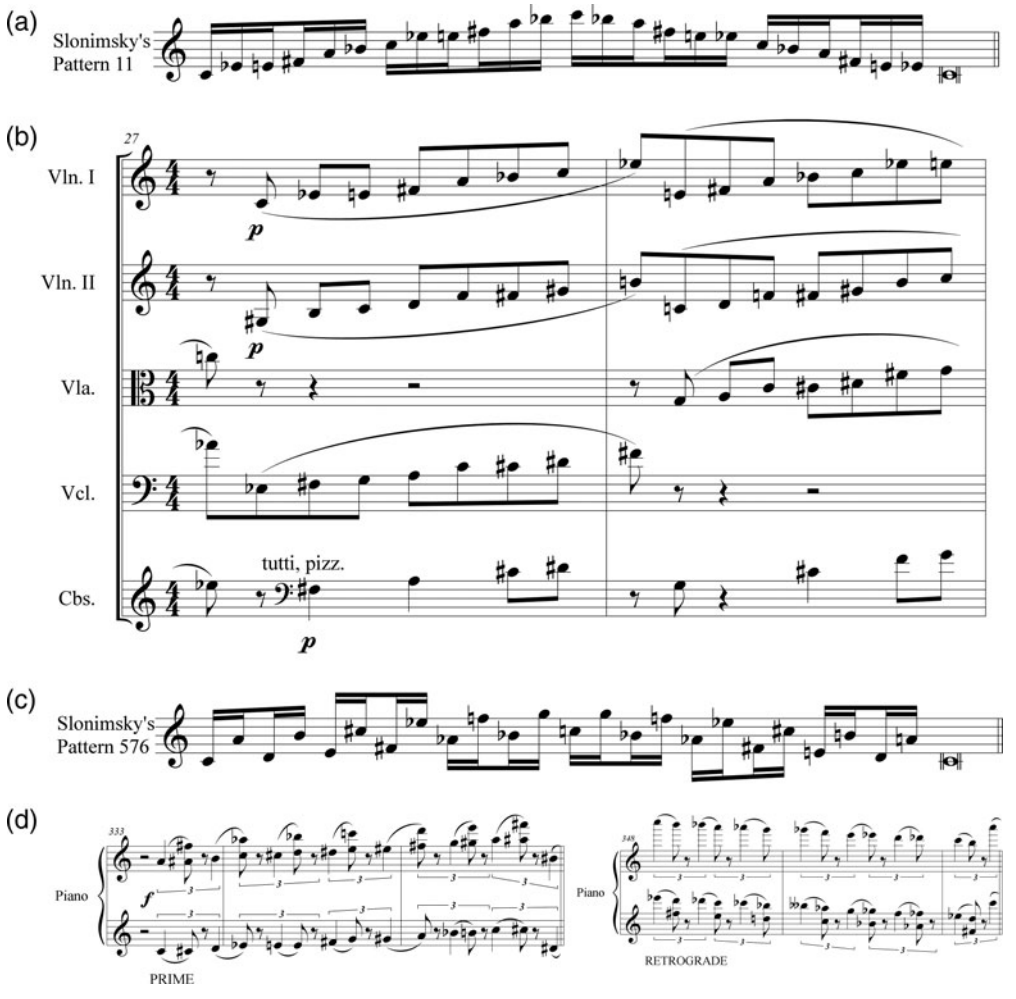
Figure 7:
Nicholas Slonimsky's *Thesaurus of Scales and Melodic Patterns*, patterns 11 (a) and 576 (c), used in Adams's Violin Concerto (b) and *Century Rolls* (d). *Thesaurus of Scales and Melodic Patterns* by Nicholas Slonimsky © Copyright 1947 (Renewed) Schirmer Trade Books, a division of Music Sales Corporation. International Copyright Secured. All Rights Reserved. Used by Permission.

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In the Violin Concerto, Adams superimposes Slonimsky's pattern with several transpositions that comprise vertical second-inversion major triads. As the movement progresses, Adams transforms this pattern through numerous rotational operations. Weyl and Darvas describe this type of symmetry as rotation, whereby an object retains its identity under a circular axis of rotation.[40] In using rotations, Pattern 11 remains intact, retaining the same octatonic subset, though the starting position of the scale is altered. In 'Hail Bop', Adams adapts Slonimsky's rhythm but retains the prime and retrograde forms using a different level of transposition for each. Pattern 576 is discernible in the highest pitches from the prime form (A^4-$F\sharp^5$-B^4-$A\flat^5$-$C\sharp^5$, and so on) and the lowest pitches from the retrograde ($E\flat^6$-$F\sharp^5$-$D\flat^6$-E^5-$C\flat^6$, and so forth). In both of these works, these patterns assume a significant role and govern motivic content following the introduction of Slonimsky's pattern. Speaking of the Violin Concerto, Adams remarked that he performed 'all kinds of operations on these rising

[40] Weyl, *Symmetry*; Darvas, *Symmetry*, p. 4.

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waves of triads, transforming them into a multitude of shapes and forms: they change mode, change direction, undergo all kinds of augmentation and diminution, and at one point even become a kind of walking bass line'.[41]

Conclusion

Reflecting on Adams's compositional career and on his ever-evolving approach to symmetry, one can posit that the progression of his minimalist style – moving from the early markers that focused on a strict adherence to audible and gradual processes, towards a freer approach that brings the composer's voice to the fore – is paralleled by his treatment of symmetry. Initially, Adams's handling of large-scale structure adhered to pre-defined symmetrical constructs. After his gate works, formal design was no longer dominated by symmetry, but rather by musical development and repetition. In Adams's allowing the large-scale construct to gradually evolve as a result of minimalist processes, one senses a balancing act between symmetry and asymmetry; but what may be so appealing about symmetry is that 'even in asymmetric designs one feels symmetry as the norm from which one deviates under the influence of forces of non-formal character'.[42] As listeners, we latch onto norms or use them as our measure for understanding the parameters of music separately and in combination. While Adams's attraction to symmetry may well stem from the natural qualities of creating a sense of order and beauty conventionally associated with symmetry, there is little doubt that Steve Reich – one of Adams's favourite composers, whose music steered Adams in the direction of minimalism – has been instrumental in defining Adams's style and perhaps even shaping his notions of minimalism. For Reich, minimalism is the musical art of symmetry.[43] And so in the current era of post-minimalism or perhaps more appropriate, 'post-styleism', as Adams describes it, the composer plays a balancing act, in which symmetry bears the capacity to animate his music while working in conjunction with minimalist processes.[44]

[41] Adams, Jemian and Zeeuw, 'An Interview with John Adams', p. 91.
[42] Weyl, *Symmetry*, p. 13.
[43] Steve Reich discusses symmetry in this manner in 'The Canon', http://www.studio360.org/story/106790-the-canon (accessed 13 October 2013).
[44] Adams in John Adams, *Hail Bop! A Portrait of John Adams*, produced by James Wills and John Kelleher, 98 min, (Kultur International Films, DVD, 2006).

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