Pantonality generalized: Ben Johnston’s artistic researches in extended just intonation

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1. Rational ordering of temporal perceptions

What are the relationships between acoustics, physiology, cognition, and specifically musical perceptions of sound in an artistic practice? How may experimental evidence gathered in any one of these fields approach the possibility of a more general knowledge: extending our awareness of ourselves, of our place and part in the flowing of all living things, the unfolding of the universe and of time?

Like children, we play music. We listen, we make sounds: calling out for echoes to discover our environment, grunting expressively to communicate our desires, or perhaps just singing under a waterfall because it charms us. A piano stands in a room; we pick out a melody suggested by the birds, finding harmonies with some notes tuned by chance, circumstance or tradition. We compose sounds and listen to them, to find out what happens, how this experience resonates physically, intellectually and emotionally.

A steady sinewave sounding seems without beginning or end, without position either in time or space: except for the remembered chiff of loudspeaker membrane or tuning-fork tines brought into oscillation, except for the changes of loudness brought about by the tiniest movements of our ears gathering shifting patterns of standing waves. Yet its pure periodicity, its cyclic repetition at a measurable frequency, perceived as pitch-height, is a projection of time onto one place, a stimulation of sensation conducted by hair cells along the basilar membrane in each ear.

Another sinewave joins, gliding slowly from unison to another frequency, perhaps from another sound source. We sense a manifold of interference patterns. Cyclic changes in loudness form pulsations, then a warm and gentle vibrato gradually becomes a more annoying bleating tremolo from a bygone era, followed by a motor-sound, roughness, maximum dissonance. Then, quite magically, a deep soft bass-tone rises from imperceptibility hand-in-hand with increasing smoothness, as two points resolve while in the background their interaction produces shadows, combination tones creating a multiplicity of tonal impressions. This flow of sensations is the continuum which forms our perception of harmonic relations between sounds, which are generally complex aggregates of frequencies. These relations are ordered by ratios of frequency, which establish patterns of unison alignments between partials.

Ben Johnston’s works are a many-layered speculative investigation, in the form of music, of how proportionality and the rational ordering of temporal perceptions experienced in sound might affect emotional and intellectual human experience. His work draws on the fundamental premise that there are
three time-scales relevant to musical cognition. Over long durations, macro-time, ordered intellectually, draws on memory – of repetitions and variations, of textural changes – to suggest divisions into sections of various lengths, shaping our impressions of musical form. The physical now, countable time, comprising rhythmic and proprioceptive awareness, accent, dynamics and pulsation, echoes the cyclic nature of body functioning, heartbeat and breathing. Finally, the level of micro-time, of instinctive response, which includes pitch, is capable of resolving periodicity of vibration as finely as 0.05 ms per cycle (20000 Hz).

This incredibly fast speed exceeds the action potential of individual nerve fibers, requiring their concerted function and the correlation of parallel analytic schemes. In addition to determining pitch, this level interprets temporal delay-patterns caused by the reflections of sounds as acoustic characteristics of spaces (echo, reverberation). It is able to localize sounds by resolving very short differences of timing and spectral balance in binaural comparisons; to recognize different angles of entry into the pinnae of the ear by distinguishing spectral modulation of sounds; to assign timbral component frequencies to various percepts correctly in real time. By serving to provide accurate interpretations of our surrounding environment, it is clear that such processes must be intricately bound up with the ongoing evolution and survival of our species.

Johnston posits that this third level is also linked to human emotional awareness, that the experience of proportional pitch relations may be described in terms of rasa, or emotional “flavor”. He cites empirical evidence: myriad distinct characters assigned to Indian raga and Arabic maqamat, both systems of melodic modes based on harmonic proportional tunings. To investigate this premise, in almost all of his works composed since 1960 Johnston has chosen to compose sounds related by complex networks of simple rational proportions, and in the process has begun inventing musical idioms of extended just intonation.

2. Just intonation and harmonic dualism

To certain 19th century theorists writing about music, among them Moritz Hauptmann (1792–1868), Hermann von Helmholtz (1821–1894), Arthur von Oettingen (1836–1920) and Hugo Riemann (1849–1919), the common practice of composition in their time represented the progressive advancement

of European art music. They believed that rational scientific investigations ought to reveal its fundamental, logical bases and thereby contribute to its further development.

Music as they knew it was based on certain axiomatic beliefs. Noises were distinguished from so-called musical sounds, namely the tones of musical instruments or voices. Pitches were constrained by a chromatic system of temperament that determined whether a sound was considered musically “in tune” or “out of tune”. Combinations of pitches were, for the most part, restricted to triadic structures; dissonances were treated according to strict conventions.

On keyboard instruments this tone system was manifest in a black-and-white sequence of keys dividing the octave in 12 more or less equally tempered\(^3\) semitone steps. These could be written up using an enharmonically differentiated system of 7 note-names modified by one of 5 possible accidentals, allowing for 35 possible notations (a legacy of Meantone temperaments, which had prevailed in European musical practice for almost 400 years). The most significant characteristic of these conventions was in fact their deliberate blurriness. By allowing pitches of flexible instruments to drift around by about a comma (1/9 tone) while nominally distinguishing spelling, 12 inflected tones could suffice to approximate 24 major and minor modes. Musicians were expected to understand and apply subtleties of intonation.

Contrapuntal voice-leading procedures, based on dyadic consonance and dissonance, were subsumed into harmonic progressions of invertible triads and seventh chords, which were ordered to suggest hierarchical tonal relations. The Pythagorean diatonic modes reduced to two equal but opposite keys in which triadic consonance was optimized: major and minor.\(^4\) With the discovery of the overtone series, various theories were advanced in attempts to ground this dualistic system in objective properties of sound.

Hauptmann presents harmony in Hegelian terms, as the manifestation of a dialectical process between three directly perceivable intervals: octave \(2^1\) (Einheit), fifth \(2^3\) (Trennung), major third \(2^5\) (Verbindung). He distinguishes between the active property of “having” a fifth and third (major triad) and the passive property “being” a fifth and third (minor triad). Rejecting tempera-

\(^3\) Equal “tempered” semitones are defined as the irrational frequency proportion 1 : \(\sqrt[12]{2}\), which may be combined to approximate the most common rational intervals within varying degrees of tolerance. Most significantly, the perfect fifth \((3 : 2)\) and perfect fourth \((4 : 3)\) are represented to within a small degree of error, measuring approximately 1/600 of an octave \((2 : 1)\).

\(^4\) The Tierce de Picardie and the chromatic alteration of sixth and seventh degrees in minor are clear indications that a completely symmetric understanding would be incomplete.
Hauptmann explicitly notates differences of a syntonic comma to obtain just triads: major as 4 : 5 : 6 and minor as 10 : 12 : 15.\(^5\)

Helmholtz also advocates and notates just intonation. He analyzes the consonance and dissonance of dyads and chords based on beats of partials and combination tones determined from rational tunings, demonstrating how consonance varies along a pitch-height glissando, and especially in different octave transpositions, inversions, registers and timbral voicings. Unlike Hauptmann, he does not dismiss prime partials higher than 5 simply because conventional practice avoids them, instead noting the relative consonance of the septimal seventh \(\frac{7}{4}\) and minor tenth \(\frac{7}{3}\). For Helmholtz, the minor chord is not an equally consonant opposite of the major chord, which exactly follows from a single harmonic series. He describes minor as a bitonal mixture, an ambiguous juxtaposition of two harmonic series, built respectively over the root and over the third of the chord, sharing the fifth of the chord as a common note.\(^6\)

Oettingen painstakingly defines two opposing principles of consonance: tonicity (based on a common fundamental, major triad) and phonicity (sharing a common overtone, minor triad).\(^7\) Based on this speculation, Riemann proposes a theory positing the actual physical existence of undertones, of a downward series of pitches symmetrically mirroring the overtones of a harmonic spectrum, and attempts to justify this by sympathetic vibration.\(^8\) Each individual pitch is seen as a fulcrum resonating both an overtone (major) and undertone (minor) harmony. At the same time, Riemann dismisses just intonation based on untempered fifths and thirds, citing the importance of maintaining the potential polyvalence of each fixed tone in the chromatic gamut.

Claude Debussy (1862–1918), in *Prélude à L’Après-Midi d’un Faune* (1894), mm. 4–10, demonstrates a musical setting that may be analyzed in terms of such dualistic conceptions of harmony. The “downward” construction of the chord A\# G\# E C\# in m. 4 consists of four pitches which all share a high G\# as a partial (in the case of A\#, its natural 7th, one octave transposed, of G\# its 4th, E its 5th and C\# its 6th harmonic respectively), articulated by the first harp’s arpeggio over a sustained harmony in the winds. In the following bar, the horns, strings, and second harp play the inverted harmony.

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an overtone chord $4 : 5 : 6 : 7$ over a low register Bb fundamental.

**Figure 1**: Particell and tuned chord schema derived from Claude Debussy’s *Prélude à L’Après-Midi d’un Faune*, mm. 4–10

Debussy extends the dualistic principle beyond a binary opposition of major/minor to show a more general possibility of chord formation from harmonic and subharmonic series. Thereby he also points to eventual limitations of the tempered system, which cannot distinguish between the minor thirds $\frac{6}{5}$ and $\frac{7}{5}$ suggested in his harmonic construction. Any chord may be considered as a sequence of intervals within a framing interval. If the order of constituent intervals is inverted, the frame and all compound intervals remain the same, but the sonority of the structure is transformed. A major triad becomes minor; a half-diminished seventh becomes a dominant seventh. If the intervals are tuned in just intonation, then each chord has a generating harmonic series fundamental as well as a least common partial. The inversion of intervals also inverts this relationship. In Debussy’s music, each chord may function as a complex sonority in itself. Its structure suggests a complex logic of characteristic relations: possible fundamentals, common partials, combination tones, registrations, voicings, transpositions, intonations, all of which may be freely unfolded musically, linked by common tones or by melodic movement to other chords.

The American composer Harry Partch (1901–1974) was profoundly influenced by reading Helmholtz, and became inspired in the late 1920s to discover the musical consequences of tuning intervals according to frequency ratios. Rather than limiting himself to the conventional triadic building blocks, he decided to include just intervals based on primes 7 and 11 in a harmonically generated microtonal gamut. This step led him to adapt and eventually build his own instruments to be able to play and compose music with the pitches of this new tone system.

9. Debussy’s choice of pitches evokes the traditional enharmonic diesis by changing spelling between chords from G to A, which may be interpreted to suggest a microtonal difference.
His tonality diamond, similar to a design invented by Max F. Meyer,\textsuperscript{10} is built around one central pitch ($\frac{1}{1}$) and two basic chord types: \textit{otonal} (intervals taken upward from a common pitch) and \textit{utilonal} (intervals taken downward from a common pitch). In each case, there is one characteristic interval defined for each odd harmonic: $\frac{1}{1}$ (unison) for the generating pitch, $\frac{3}{2}$ (perfect fifth), $\frac{5}{4}$ (natural major third), $\frac{7}{4}$ (natural seventh), $\frac{9}{4}$ (major ninth), $\frac{11}{4}$ (natural eleventh, an octave-plus-fourth greater by a quarter-tone). Like extended jazz harmonies, Partch’s hexads combine various kinds of thirds: major ($\frac{5}{2}$), minor ($\frac{6}{5}$), septimal minor ($\frac{7}{6}$), septimal major ($\frac{9}{7}$), and neutral ($\frac{11}{9}$), distinctions impossible to make within the equal tempered scale. Since Partch decided to build his own orchestra, his tonal gamut was always more or less fixed and at times overshadowed by the choice of instrumentation.

After six months working as Partch’s apprentice, learning to tune and play the instruments, Ben Johnston realized that he would pursue a different path. Encouraged further by John Cage, with whom he also studied during a sabbatical spent in New York (1959–60), Johnston began composing in just intonation for acoustic instruments. With each new work he devised his tonal repertoire anew, choosing a particular subset from the infinite space of possible tone relations, and proceeded to find the means necessary to unfold

\textsuperscript{10} Cris Forster, \textit{Musical Mathematics} (San Francisco: Chronicle Books, 2010), Chapter 10 Part VI.
this space in a logical, humanly perceptible way.

Very early on, Johnston made a most remarkable observation about the reconcilability of serial pitch organization and extended harmonic dualism. If a row is harmonically constructed in just intonation, then its inversion translates otonal structures into utonal ones and vice-versa. Like Schönberg, Johnston loves precisely conceived and executed structural conceits, and his genius is to conceal a rigorous, mathematical inner order under a seemingly simple and often ravishingly expressive exterior.

3. Otonality and Utonality in Johnston’s music

3.1. String Quartet No. 2

In the *String Quartet No. 2* (1964), the first movement is 54 bars long. Each bar begins one step higher than the last, tracing out an enharmonic 53-tone rising scale from C to C as its hidden *cantus firmus*. The pitches used form a subset of two-dimensional 5-limit harmonic projection space, the classical tone-lattice identified by Leonhard Euler and generated from the building blocks noted by Hauptmann: $\frac{5}{4}$ (treated as an equivalence relation), $\frac{3}{2}$, and $\frac{7}{4}$. Composing through the microtonal steps, connecting them by discovering characteristic melodies and harmonies of tuneable intervals and aggregates in a manner that may be perceived by players and listeners, is the first, most basic idiom of any music which explicitly notates differences of intonation.

Johnston’s scale is built from three enharmonic steps of approximately similar size: the Syntonic Comma (81 80 or 22c); the Diesis (128 125 or 41c) less a Comma (=20c); the Chromatic Semitone (25 24 or 71c) less a Diesis (=30c). The 53-tone scale’s harmonic structure “interrelates by inversion major and minor scales, and makes clear distinction between diatonic, chromatic, and hyperchromatic levels of complexity”. The order of Johnston’s tone row is

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11. James Tenney distinguishes *harmonic space*, in which every prime number generates its own tonal axis, and *projection space*, in which pitches any number of octaves apart are considered as equivalent pitch-classes.
13. The difference between a perfect fifth $\frac{3}{2}$ and a perfect fourth $\frac{2}{4}$ is called a Pythagorean whole tone $\frac{2}{4}$. A Syntonic Comma $\frac{81}{80}$ is the difference between two $\frac{3}{2}$ wholetones ($\frac{27}{24}$) and a $\frac{5}{4}$ major third ($\frac{27}{24}$).
14. The Diesis $\frac{128}{125}$ is the difference between three $\frac{5}{4}$ major thirds and an octave. It comprises approximately two commas and is the characteristic enharmonic difference between sharps and flats.
designed to make the hyperchromatic intervals actually playable. For example, the first three pitches C–E♭–E are followed by their transposed inversion B–G♯–G, outlining the perfect fifth/fourth C–G. C is sustained as E♭ (5/4) and E (3/2) are played against it successively. By tuning the just intervals by ear, the melodic Chromatic Semitone between them is effortlessly realized. In a similar manner, the second half of the bar continues the intonation by untempered thirds so that the F reached at the end of the bar is exactly one Syntonic Comma higher than the perfect fourth of the initial C, producing a modulation upward into the second bar.

**Figure 3:** Pitch-class tone row from Ben Johnston, *String Quartet No. 2*, Movement 1. Note that the Helmholtz-Ellis notation has been transposed one syntonic comma lower to simplify reading of this example. In normal usage, Johnston writes the open strings as C-G-D-A-E, so Johnston’s E (in bar 3) is usually equivalent to E♭ in HEJI, which notates the open strings C G D A E.

![Johnston Notation](image1)

![Helmholtz-Ellis Notation](image2)

**Figure 4:** Tone-Lattice representation of the previous row.
It is exactly this kind of spiraling movement, in which a sequence of just tuneable intervals reaches a point of enharmonic non-equivalence, that characterizes music written in just intonation. Modulation in such a situation entails that pitches *adjust to each other*, changing their intonation and forming new
constellations rather than simply circulating through a fixed cycle. In this generalized pantonality lies a poetic echo of how freedom – anarchic individualism, the acceptance of multiplicity and difference – is bound with collective social responsibility: the emblematic process of intonation.

Ben Johnston’s concern with applying invertible, proportional organization to his material is evident not only in the choice of pitches and their intonation. His rhythmic structure also makes use of proportions of meter and of subdivision. The smaller enharmonic steps of his scale (22c or 20c) are set in bars 5 eighth notes long, whereas the larger step (30c) is always given 8 eighths. The divisions within bars themselves also mirror 5-limit pitch relations. For example, in bar 5 the 10 16th notes are grouped 6+4 (in the proportion $\frac{3}{2}$) and then each group is further divided in quintuplets, 5 : 6 and 5 : 4.

This kind of proportionality of rhythm, transposing intervals of “microtime” perceived as pitch relations to the scale of countable pulsations, is well-known from speculations in Henry Cowell’s New Musical Resources (1930) later echoed by Karlheinz Stockhausen in Wie die Zeit Vergibt (1956), and of course as evidenced in musical works of both Charles Ives and his student, Elliott Carter. Johnston has often also composed rich metrically polyphonic textures, notably in the virtuosic Knocking Piece (1962) for two players, in which the equal-tempered piano is treated as a percussion instrument while its old-fashioned tuning system is pointedly ignored.

Figure 6: Ben Johnston, Knocking Piece (excerpt).

In the Quartet No. 2, aspects of the 53-tone scale’s internal organization
are also applied to the level of “macro-time”, the division of the 54 bars into recognizable phrases articulated by contrast and repetition.\textsuperscript{16} John Cage argued that music structured by the methods of conventional tonal harmony, or by pitch-based serial organization, did not comprehensively account for the nature of sound, including noise and silence, which are more appropriately organized in terms of their common parameter, time. To apply this in composition, Cage developed the notion of square-root form, dividing an entire movement into proportional parts, each of which themselves bear the same inner divisions. This structure is articulated freely by complex sound-aggregates drawn from a gamut and treated non-hierarchically. Johnston seeks to generalize and widen the scope of Cage’s invention, by asking what heard properties of sound structures might articulate temporal structures most clearly and diversely on all levels, including that of pitch.

Throughout the 1960s, inspired by the uncharted possibilities of new tuning systems, Johnston composed a series of works integrating harmonic and serial principles of organization. Among them: \textit{Five Fragments}; \textit{A Sea Dirge}; \textit{Knocking Piece}; \textit{Sonata for Microtonal Piano}; \textit{String Quartet No. 2} and \textit{String Quartet No. 3}; \textit{Quintet for Groups}; \textit{One Man}. Absolutely evident, already in these early pieces, is how Johnston’s extremely elaborate, crystalline conceptualization of structure serves to clarify perception of his music. Keenly aware of the avant-garde, of experimental music, by the end of the decade he became increasingly disillusioned with outward manifestations of complexity. Instead, he began seeking an organized unfolding of sound which may be directly understood by – and most importantly, which invites the pleasure of – unmediated listening.

3.2. \textit{String Quartet No. 5}

The opening hymn of \textit{String Quartet No. 4 “Amazing Grace”} (1974), with its transparent Pythagorean melody and lyrical counterpoint, boldly sweeps away the pretensions of academic “new music” strictures, without resorting to cliché, pastiche or postmodern irony. It is a breathtaking, ecstatic statement of personal liberation, of fresh beginnings along with all the difficulties such steps entail. Perhaps even more originally so is the dark reflection of \textit{String Quartet No. 5} (1979). A microtonally inflected melody weaves through successive evocations comprising Johnston’s structural homage to Mallarmé and Debussy’s \textit{L’Après-Midi}, shaping a private symbolic landscape. The hymn text “Lonesome Valley” reflects upon the one inescapably lonely.

path which we must all one day journey: to our own death. Each new occurrence of the song takes a different inflection of harmonic space, drawing on intervals from the first 16 partials of the harmonic series to generate subsets of an otonal/utonal 13-limit lattice in five tonal dimensions.

In the first occurrence, the plain Pythagorean chord of the cello open strings is slowly arpeggiated, molto pizzicato, evoking a shifting rain of high harmonics. The two inner voices slowly alternate two utonal chords: the 5-7-11 identities of G and D respectively. The pentatonic melody is set from two utonal tetrachords, also derived from G and D as the undertones 9-11-12. A second occurrence (m. 32) of the same melody is harmonized as a sequence of alternating utonal and otonal 13-limit chords in various voicings, fanning outward from a closed to a more open, spectral setting of the pitches.

Subsequent recurrences explore different intonations of the pentatonic melody: 5-limit, 7-limit, successive overtone/undertone sequences of one generating pitch. Textural treatments include sustaining drones, homophonic chords, alternating patterns of microtonal thirds, two- and four-part counterpoints and rhythmic polyphony. Approximately at the structural golden section of the piece, there is a 12 second long passage of extreme rhythmic complexity, in which the four parts play at four independent tempi in the proportion 24 : 27 : 30 : 32. Finally, before the last statement of the melody, there is a moment of conceptual plainness echoing the hyperchromatic scale in the earlier Quartet No. 2: a rising and falling by microtonal steps, harmonized (m. 182).

The following examples have been transcribed into the Extended Helmholtz-Ellis JI Pitch Notation from Ben Johnston’s original.

Figure 7: Ben Johnston, *String Quartet No. 5*, opening, 11-limit melody and chords.

![Figure 7](image)

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Figure 8: Ben Johnston, *String Quartet No. 5*, m. 32–, 13-limit otonal/utonal chord progression.

Figure 9: Ben Johnston, *String Quartet No. 5*, m. 77–, 5-limit melody accompanied with various 13-limit “thirds”.

Figure 10: Ben Johnston, *String Quartet No. 5*, m. 96–, 7-limit counterpoint.

Figure 11: Ben Johnston, *String Quartet No. 5*, m. 182–, 13-limit hyperchromatic scale harmonized. *Special thanks to Thomas Nicholson and Stephen A. Taylor for correcting two errata, 2018.*
As Johnston’s work developed in the 1980s, it revisited compositional techniques like variation, rhythmic polyphony and palindrome in new and continually evolving tonal contexts. His invention of lattice diagrams with separate axes for the characteristic intervals of each prime number, which influenced James Tenney’s description of a generalized harmonic space, allow Johnston to sketch harmonic forms based on the higher partials, and to unfold these forms into scales and gamuts that become melodies and harmonies. Movement between various subsets of the tonal space implies a modulating network of generating pitches, sometimes lying in the bass register and sometimes in a higher voice. Harry Partch’s monophony, his 43-tone 11-limit just intonation scale derived from one central pitch and completed with a selection of related auxiliary tones, becomes generalized into the first fully modulating system of extended just intonation reaching to the limits of intervallic discrimination.

### 3.3. String Quartet No. 6

In his *String Quartet No. 6* (1980), Johnston applies the rigorous methods of his 1960s music to explore Partch’s tone system in a modulating context. In spite of using strict serial organization, presenting all 48 forms of a 12-note row that combines otonal and utonal 11-limit hexads, the focus of the piece is a minimalistic, continuous melodic flux. Each of the four players alternates as soloist against sustained harmonic drones which permit intonations to be precisely realized. Dynamically shaped melodic contours drift through the instruments’ registers, following a mathematically determined arc of tempo modulations, in a flow which remains unbroken through the course of the approximately 20-minute composition. In measure 298 a mirroring occurs and the material is repeated in retrograde to the end of the work, at which point the piece begins once again by repeating the first two bars (suggesting the possibility of proceeding in an endless loop). The music combines a deliberate avoidance of dramatic contrast and a flatness of surface with melodic expressivity, offering a fascinating and conceptual listening experience. It is completely and engagingly focused on the movement of sounds around peculiar quasi-whole-tone gamuts with successive intervals $7 : 8 : 9 : 10 : 11 : 12$, which we come to know in great detail by appreciating their sound forms without any poetic-associative distractions.

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Ben Johnston, born in 1926, has continued composing into the 21st century, and in the process has created a pioneering, highly individual body of work in extended just intonation for acoustic instruments. His numerous works for a cappella voices, voices and instruments, mixed ensembles, and in particular his ten string quartets, offer a repertoire which is one of the artistic highlights of the experimental music tradition. Yet he remains, even more so than his close friend and colleague James Tenney, one of “America’s most famous unknown composers”.

Johnston’s explorations are an inspiration and point of further research for many younger composers, but much of his work has yet to be explored critically, recorded and performed. Recent public recognition of his music, marked by the SWR orchestra prize awarded by the musicians at the 2008 Donaueschinger Musiktage for *Quintet for Groups*, by enthusiastic reviews of his ongoing series of studio recordings with the Kepler Quartet, and by numerous performances in Southern California and across the United States, show that the technical challenges of playing his music are being met, revealing a music of rich aesthetic diversity and originality.
4. Beginner’s Mind

The general adoption of 12-tone chromatic equal temperament in the 19th century required that all of its intervals be heard and accepted. This led to novel progressions and sounds, introduced previously avoided combinations of pitch and timbre and eventually led to systematic catalogues of the chromatic steps in manifold combinatoric permutations. The so-called emancipation of dissonance began as a search for tonal relations embracing all 12 tones by seeking out the higher reaches of the harmonic series.

The use of clusters with tones of various intensities blurs pitch discrimination and may produce an aural illusion of intermediate frequencies accompanied by a rapid tremolo. Musical works of Alexander Scriabin, Alban Berg, Morton Feldman, Thelonious Monk, Bill Evans, Giacinto Scelsi, György Ligeti, Erhard Grosskopf, Claude Vivier and Walter Zimmermann, among others, continue to discover harmonic characteristics of the entire tempered 12-tone set, but do so in a necessarily fragmentary and intentionally floating way.

The ambiguity of enharmonic equivalence, which allows fluid movement between fundamentals in triadic music, actually restricts further evolution of harmony because it depends on an inherently muddy intonation. Vibrato and random detunings, as well as extreme changes of register, loudness, color and sound spatialization, have become commonplace to disguise the systematic distortion of natural intervals. From the early 20th century, the obvious limitations of this tonal system began to favor vivid investigations of noise, the flowering of percussion ensemble music, the search for extended techniques on instruments, and pioneering work in microtonality.

Today, the flexibility of computer controllers and their integration with conventional instruments allows an unlimited adaptability to different tonal systems, just as techniques of sound production are commonly reinvented from piece to piece. Instead of spinning around the tonal clichés of a prefabricated temperament, Johnston offered first steps in this direction, accepting the entire glissando-continuum of pitch and noise, all sound, without any strictures, finding sounds as the music demands.

For generations, new music has suffered from a self-imposed novelty label, marketing a parade of fashionable concept-musics, intellectually justified ideological tropes which disguise their shallow substance and their anxiety behind dogma, coolness or cultural lineage. Emancipation of materials alone becomes a continually refined set of strictures, introducing new levels of specialist expertise to avoid the most basic actual problem: composing music we actually need. To do so requires an act of intellectual and emotional honesty: it
asks for an emancipation of ourselves, an embrace of consonance, dissonance, noise, and all of our intellectual, physical, and emotional responses to experiencing these properties of sound as sensation and as music, to seek what we may find.

Ben Johnston’s work takes as a fundamental premise that every moment of making and listening to sounds is always a beginning and ending, taking measure of infinitely many possible cycles stretching back into forgotten memory and projecting into unknown futures – an ongoing, shared undertaking that is part not only of human culture, but of everyday human life experience.

Beginner’s Mind. Music reminds us, returning again and again.
References


