STUART GREENBAUM

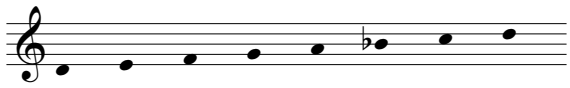
the infinite heartbeat

This article concerns the third movement of a four-movement sonata for violin and piano. It was composed in the year 2000 for Australian violinist, Marianne Rothschild, who (together with pianist, Kenji Fujimura) gave the premiere performance at the Australian National Academy of music in South Melbourne on the 21st of December in the same year. It has since been included on the licentiate syllabus for the AMEB and the 3rd movement recorded for ABC Classics by Miki Tsunoda and Caroline Almonte.

harmonic structure

The Infinite Heartbeat is constructed around an essentially modal (aeolian) pitch set which is based in D.

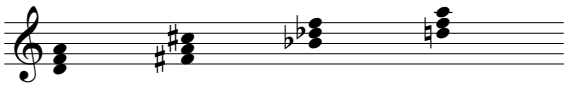
EXAMPLE NO.1
D aeolian



While the piece is not strictly tonal, it does include some aspects associated with tonality, including scales, triadic chords and pivotal modulation. The terms 'minor', 'major' and 'key centre' are applied for convenience, though these should not be thought of in terms of conventional tonality.

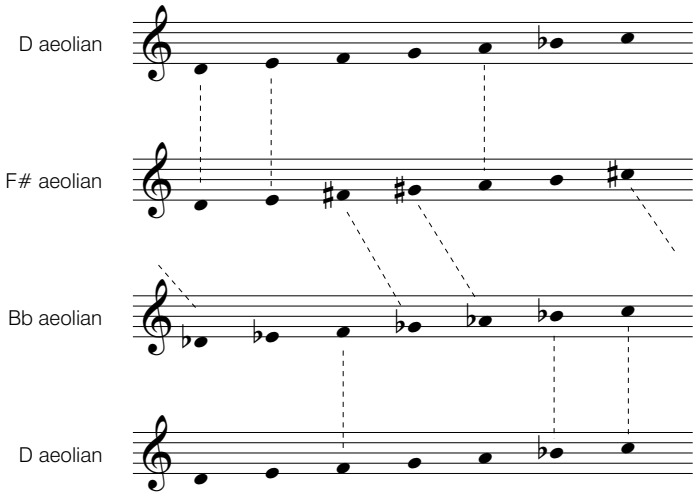
The modulations all occur at the interval of the major third, creating an augmented chord symmetry around
D - F# - Bb – D.

EXAMPLE NO.2
minor triads rising by major thirds



Given an aeolian mode, this means that three of the seven pitches will be in common with the new centre, and these are used to create pivotal modulations.

EXAMPLE NO.3
pivotal modulation using common tones



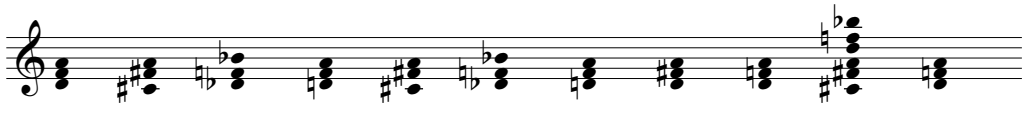
The harmonic centre moves from D to F# to Bb and back to D according to the following table:

EXAMPLE NO.4
succession of keys

KEY	BARS
Dmin	1-21
F#min	22-25
Bbmin	26-28
Dmin	29-35
F#min	36-43
Bbmin	44-47
Dmin	48-50
Dmaj (chrom)	51-56
Dmin	57-79
F#min / Bbmaj	80-81
Dmin	82-106

If reduced to close-voiced harmony, the piece essentially follows the following progression:

EXAMPLE NO.5
harmonic reduction of *the infinite heartbeat*



A symmetrical three-chord cycle goes around twice before arriving at a chromatically altered D major, which is the emotional centre of the piece. After this, the cycle is compressed so that F# minor and Bb major are superimposed bitonally (albeit briefly) before returning to D.

Taking into account the 12/8 bars which last twice as long as the 3/4 bars, the proportion of key centres is as follows:

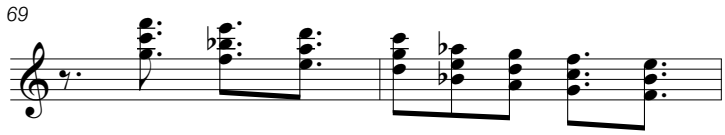
EXAMPLE NO.6
percentage breakdown of key centres

KEY	PERCENTAGE OF DURATION
D min	73%
F# min	10%
Bb min	6%
D maj (chrom)	9%
F# min / Bb maj	2%

This table shows that almost three-quarters of the piece is based in D minor. Excursions to F# minor are brief and shorter still when moving to Bb minor. While the F# and Bb centres are relatively transient, their function is central to the programmatic idea of an expanding universe. The modulations represent journeys to remote, distant areas and yet the symmetrical chain of modulations (all moving by a major 3rd) lead back to D every time. In this sense, the pattern has no final endpoint – merely a cyclical expansion.

In addition to the cycle of pivotal modulation, a few other smaller aspects of harmonic colour can be observed. In the second half of the piece (after bar 60) there is increasing use of quartal harmony in the piano. This is mostly a revoicing of the aeolian pitch set.

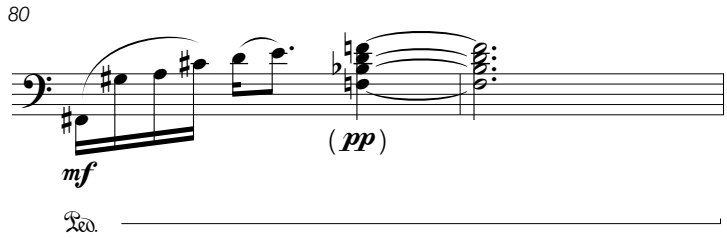
EXAMPLE NO.7
quartal harmony



This sometimes results in the implication of jazz harmony - F#7 (#9) – when 4ths may be augmented by the naturally occuring tritone (Bb-E). This jazz implication can also be found horizontally by the alteration of a falling ‘blues’ note (Ab) at bar 70 – a tritone away from the central note.

Even more extended in relation to the basic modal pitch set is the superimposition of two distant triads at bar 80, resulting in a momentary bitonality.

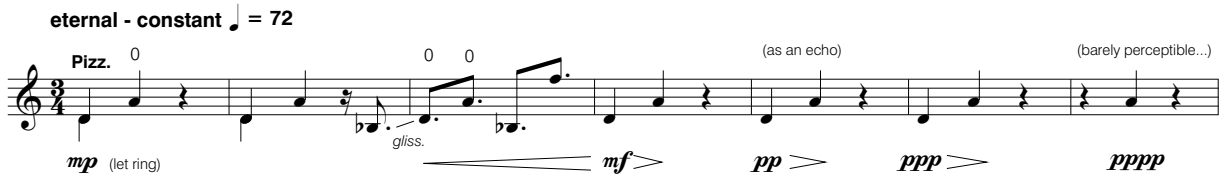
EXAMPLE NO.8
bitonailty sustained with piano pedal



motivic and rhythmic structure

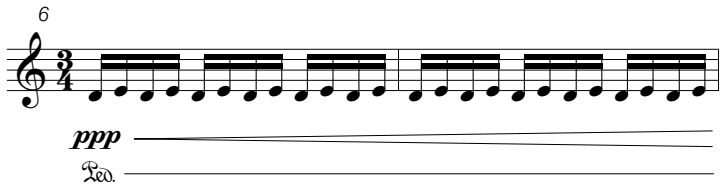
A number of motivic shapes can be found in this piece. Some are purely melodic invention and ornamentation; others play a more structural role. The opening pizzicato motive in the violin only appears in this guise at the very beginning and end of the piece:

EXAMPLE NO.9
heartbeat motive



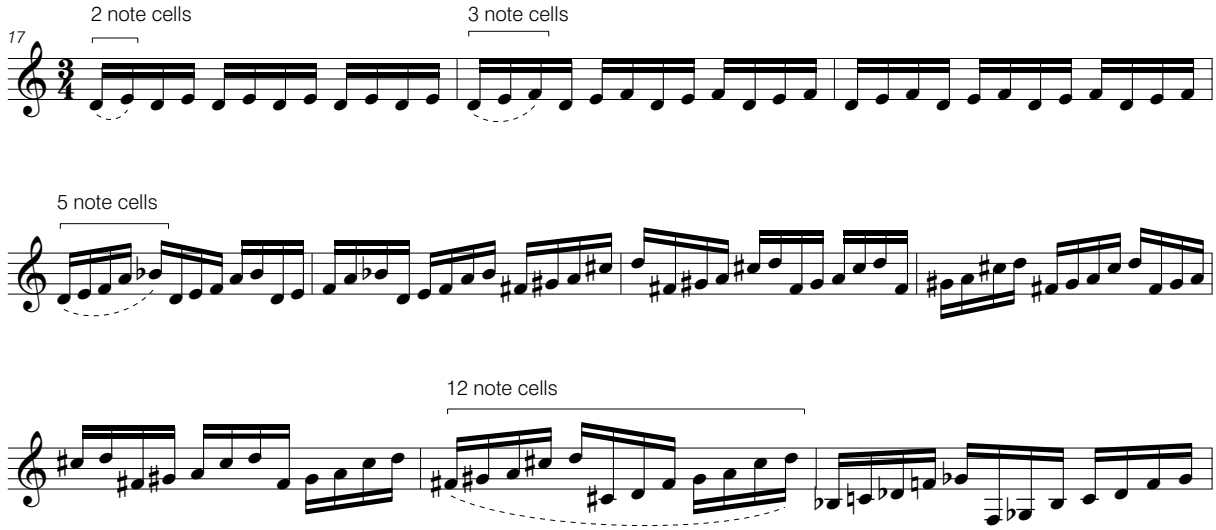
It does also appear ‘arco’ in the main melodic flow, but its main purpose, initially, is to represent a kind of heartbeat. As it fades out, the implication is that source is moving away but that it continues on. This crossfades with the piano which opens with an oscillation of two notes, a tone apart.

EXAMPLE NO.10
oscillation at start of ostinato motive



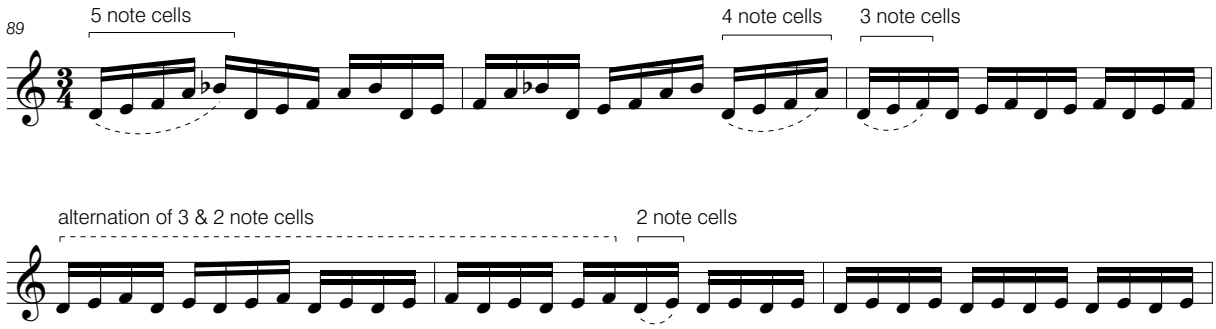
This oscillation is used as an ostinato throughout most of the piece, though it gradually expands from a two-note cell into a 12-note cell. This expansion takes around 20 bars (from its first appearance at bar 6) and therefore the arrival of the fully expanded motive is subtle.

EXAMPLE NO.11
expansion of ostinato cells



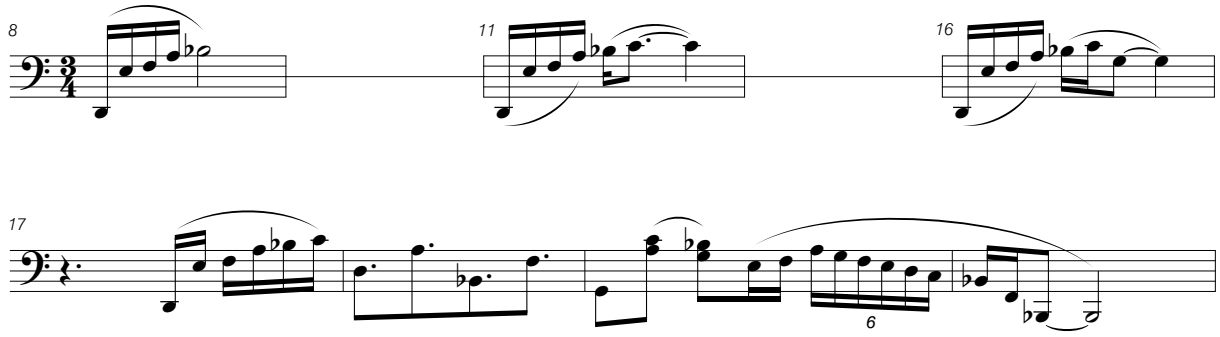
Toward the end of the piece, this process is reversed and the motive gradually reduces from five notes back to two, as seen at bars 89-93

EXAMPLE NO.12
liquidation of ostinato cells



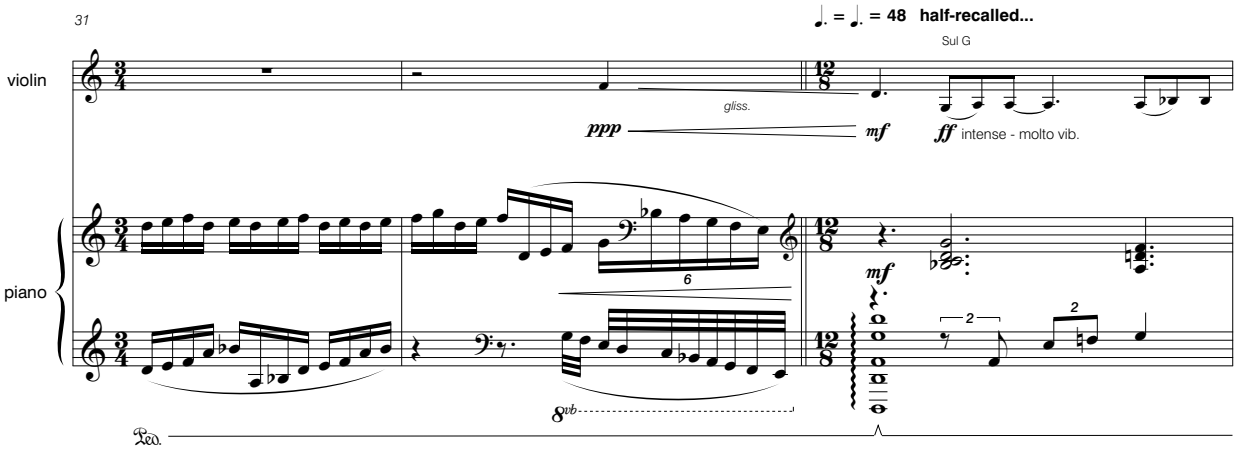
In addition to this expansion/contraction is a rising motive in the left hand at bar 8 (based on the main ostinato motive). This also expands, but in a shorter period of time (over only 10 bars), and combined with its clearly separated instances is more overtly noticeable.

EXAMPLE NO.13
expansion of left hand motive



The pizzicato 'heartbeat' motive (refer back to ex.9) additionally acts as a microcosm of rhythmic ambiguity, which is at the heart of the entire piece. Two bars of 3/4 grouping are followed by a bar of 12/16 grouping. This principle is then further exploited through the use of rhythmic modulation, first found at bar 33.

EXAMPLE NO.14
metric modulation



The value of a quaver (or dotted crotchet) is unchanged in tempo, but the rhythmic grouping is altered. This creates a different pulse, and thus the 'apparent' change in tempo – even though the quaver speed has not altered. This effectively results in an audible 'gear change' – the slower pulse creating a gravity underpinned by the introduction of new material. This material is actually a reprise of motives found in the 1st and 2nd movements of the violin sonata, but their first appearance in the 3rd movement is at bar 33.

The move back to 3/4 is also a metrical modulation (semiquaver = semiquaver). This gear change back is more subtle and again starts with a 2-note oscillation which repeats the process of phrase expansion all over.

extra-musical background

The infinitely expanding universe may, according to some theories, eventually contract (as occurs in formation of black holes). The idea of an infinite heartbeat might viewed in terms of 'universal' expansion and contraction. 'The heartbeat' might also be viewed as a human presence within an infinite universe.

The sections of this piece which are in 3/4 make up 85% of the overall duration. These sections are intended to represent the vast expanse of the universe and the opening of the score is marked 'eternal – constant'. In the words of cosmonaut Aleksei Leonov, "What struck me most was the silence. It was a great silence, unlike any I have encountered on Earth, so vast and deep that I began to hear my own body: my heart beating…"

Set within this 'universe' are two episodes in 12/8 which make up the remaining 15% of the overall duration. They are marked "half-recalled…" and "with the weight of memory" respectively in the score. These sections reprise material from the first two movements and are intended to represent a deep nostalgia often felt by astronauts, alone in space; a small core of humanity in an eternally vast and eerily silent universe.

This 3rd movement is best heard in the context of the overall 4-movement sonata, but can also be appreciated in its own right and without any programmatic connotations. It exists as a self-contained piece of abstract music, though listeners may appreciate another level to the piece when heard from an understanding of the programmatic ideas that inspired its composition.

terms for further reference

aeolian mode
bitonality
blues note
ostinato
pitch set
pivotal modulation
quartal harmony
rhythmic modulation

CD recording available through ABC Classics