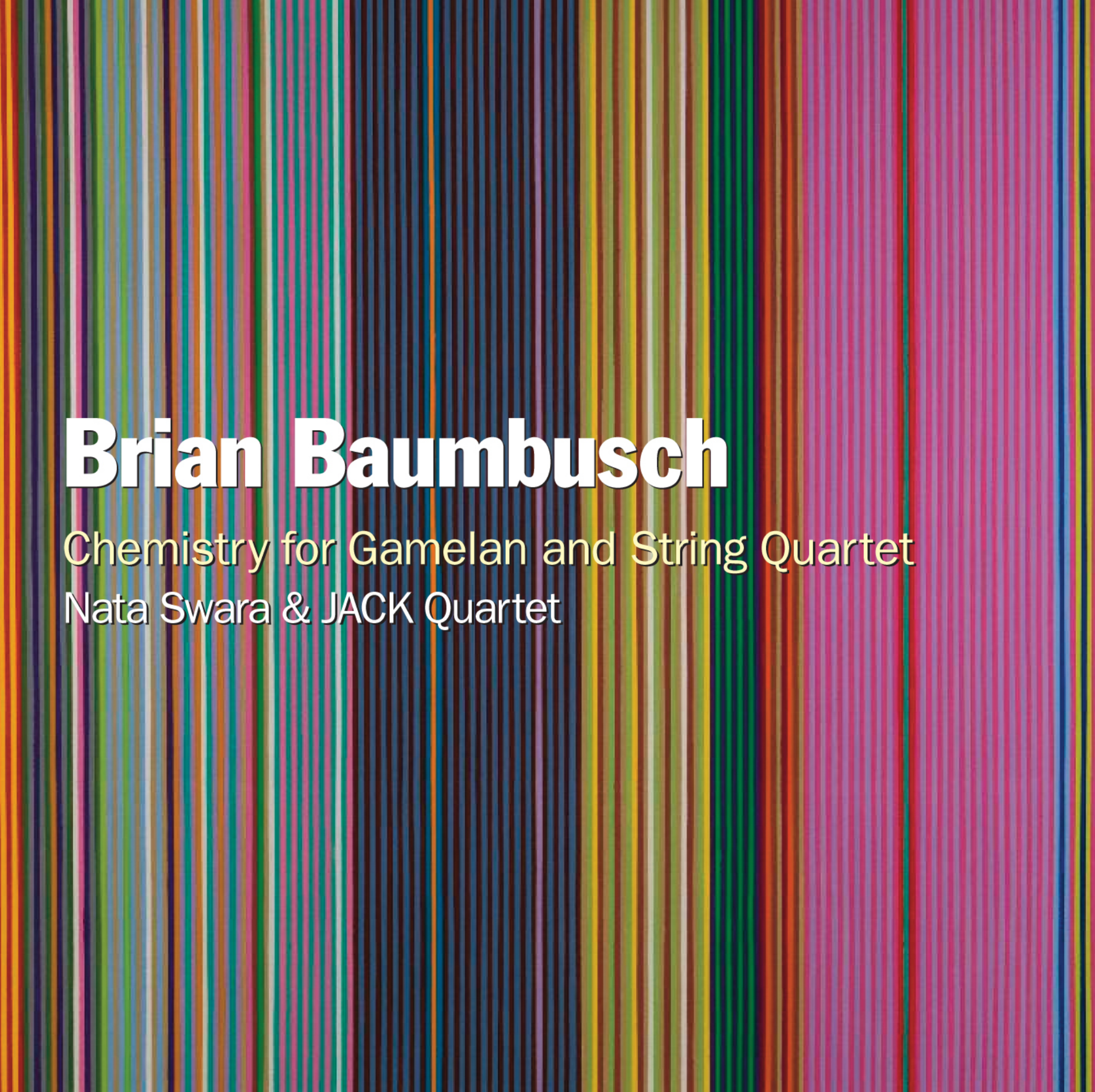
Brian Baumbusch
Chemistry for Gamelan and String Quartet
Nata Swara & JACK Quartet

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Instruments

Walking into the house compound of young Balinese composer Putu Septa, past caged roosters and motorbikes, one immediately notices many musical instruments. In a three-walled *bale* (raised open-air studio), open towards Bali's central mountains and under a warped, thatched straw roof, one set of unexpected instruments is squeezed in. They have a plain wood construction, unadorned with the usual gold-lined carvings.

There are six metallophones; a pair in the middle look like Balinese *gangsa*, with most of the keys of the standard shape and construction: bronze trapezoids slightly bent across their length. When sounded, their characteristic shapes give rise to a distinctive array of partials not from the harmonic series. In front of them are a pair of metallophones made with flat, silver keys of anodized aluminium, and another taller pair behind seem like two tall, large-keyed vibraphones. You need a bar stool to play them, as their deepest resonators are more than waist-high. In the center there's a *reong* (an instrument comprised of a row of *pencon*: gong-chimes) of sorts. While its row of new, shiny, bronze *pencon* seems to be fairly normal, they sit on a long strip of foam supported by a short, skeletal metal frame, rather than on cords suspended by wooden slats. These instruments are called "Gen 2" (a nod to the Balinese composer Dewa Alit and his seminal composition, "Genetik"), assembled between 2018 and 2021 by California-based composer **Brian Baumbusch** (b.1987).

Carefully slotted into a hole in the straw roof is a homemade housing for a set of homemade microphones. These microphones captured the sparkling, rounded shimmer

of these instruments, reproduced on this CD's first piece. Gen 2 is tuned to a variant of *saih pitu* ("row of seven"), the variable 7-tone Balinese parent scale derived from Javanese *pelog*. In Bali and Java there are almost as many tunings and temperaments as there are gamelan, giving each set of gamelan instruments a unique character within the intervallic norms of *pelog* or *slendro*. These instruments are indeed special: Their scale is inspired by

Baumbusch "Gen 2" instruments at Sanggar Nata Swara in Ubud, Bali, January 2022. Photo by Brian Baumbusch.

18th-century keyboard temperaments,[1] while applying the paired tuning techniques of Balinese gamelan instruments in such a way as to subsume equally tempered (ET) pitches within the span of its interference beating (the shimmering effect known as *ombak* "wave").

Over on a facing *bale*, beckoning for attention are another set of instruments even more foreign to this Balinese setting. Most were clearly not made by a Balinese *pande* (gongsmith). The steel keys on these six metallophones seem old, with a layer of brown rust, rather than the green oxidized patina of bronze. While bent like Balinese keys, the keys are not bevelled in the typical trapezoidal shape. This set also includes four flat, wooden-keyed instruments with concave undersides like a marimba, carefully carved to accentuate particular partials. Underneath these are futuristic, transparent acrylic resonating tubes. All these instruments, as well as a set of *pencon* with both sunken and raised knobs on a tall metal frame, stand much taller than standard Balinese instruments, since they are meant to be played while standing. These comprise Baumbusch's "Lightbulb Instruments (a.k.a. Gen 1)" constructed between 2011 and 2014.

Tuning: Approaches and Ideologies

Originally, the musicians assembled to play the Lightbulb instruments were the first iteration of the Lightbulb Ensemble, based in Oakland, California. The symmetrical tuning arrangement designed for these instruments connected musical form and tuning for the Lightbulb Ensemble's inaugural piece, *Prana*, and subsequently *Mikrokosma*.[2] Baumbusch designed the tuning while drawing inspiration from the

[1] Specifically, the particular characteristics of the temperaments Werckmeister III and Thomas Young's 1799 temperament were part of Baumbusch's inspiration for this tuning.

[2] See Michael Tenzer's liner notes for *Wayne Vitale & Brian Baumbusch: Mikrokosma* (New World Records 80785, 2017) for more details on these instruments, their symmetrical tuning arrangement, and how they were used for Baumbusch's previous compositions.

work of William Sethares, a music theorist and engineer who intensively analyzed the relationships between timbre, tunings, and scales.

Part of Sethares' work included documenting the special properties of Indonesian gamelan instruments, bringing into focus how the idiosyncratic *inharmonic* partials of their metallophones and tuned gong chimes could be directly related to the scales that have evolved for these instruments. Wanting to show continuity with the elemental theories of Pythagoras, Euro-American music theorists have primarily focused on the *harmonic series*, the set of integer-multiple frequencies naturally produced by strings, pipes, and voices, for the development of scale and tuning theory. The allure of the "naturalness" of such a numerically neat epistemology of tuning has led theorists and composers to overlook other ways of creating tunings, creating an exotic stigma around Javanese and Balinese instruments, which, although equally as "natural," could not be explained through any harmonic paradigm.

Nevertheless, various composers have tried to meld the two sound worlds. Perhaps the most well-known example is Lou Harrison, who, captivated by the sounds of simple frequency interval ratios, used Just Intonation (JI) for composing and instrument building. With his partner William Colvig, he constructed three aluminium percussion ensembles to explore his tuning interests, using several scales with JI intervals. For the first set, nicknamed "The American Gamelan," he wrote only three pieces before immersing himself in the study of Javanese music. Colvig and Harrison then went on to build two Javanese-style gamelan, named Si Betty and Si Darius/Si Madeleine, which approximated Javanese *pelog* and *slendro*, while also using JI intervals and finding points of commonality with equal temperament, e.g. by tuning pelog pitch 5 to A = 440Hz. Mills College was one locus of his activity, where he conferred with the Javanese composer and gamelan master known as "Pak Cokro" who taught at U.C. Berkeley, and who approved Harrison's JI realization of the Javanese scales.

Perhaps Harrison's interest in JI tunings superseded what the properties of metallophone instruments might suggest for scale tunings.[3]

Baumbusch encountered two sets of Harrison's instruments after moving to California. While studying at Mills, Baumbusch built a set of shelves in Mills' gamelan room to store Si Darius in order to clear a footprint for his own Lightbulb instruments. Later, when teaching at U.C. Santa Cruz, Baumbusch performed some of Harrison's music on "Old Granddad" and took notes from the frame and aluminium bar designs that Harrison and Colvig had created a half-century earlier. While joining the lineage of American instrument-building composers like Harrison, and Harry Partch before him, Baumbusch branched down a different path by using the analysis of the inharmonic spectra of his materials to design a scale for them, the process used to tune the Gen 1 instruments.

Compositional Setting: Bali and Polytemporality

In January of 2022, Baumbusch shipped his two instrument sets to Bali. For some of their bars and *pencon*, this was a return home, after they had been tuned in the U.S. to Baumbusch's specifications. He sent them to the sub-district of Padangtegal in Bali's cultural centre of Ubud, gifting them to the aspiring gamelan ensemble Nata Swara. The group rehearses in the home of their leader, composer I Putu Adi Septa Suweca Putra (Putu Septa). Nata Swara's members are local musicians experienced in contemporary gamelan music. Some are composers themselves and many play in similar nearby groups such as Gamelan Salukat (led by Septa's former teacher and maverick Dewa Alit) and Gamelan Yuganada (led by composer and ethnomusicologist Wayan Sudirana).

Why transport these heavy instruments more than 8000 miles to Bali? As well as hopes to foster an ongoing symbiotic cross-cultural collaboration,[4] Baumbusch had a hunch that the musicians of Nata Swara possessed the musical skills to execute some of the novel rhythmic challenges presented in his music. For the last decade, Baumbusch has

been experimenting with the temporal aspects of music, stretching them to and beyond the edges of human perception of musical time. These ostensible limits come from psychological research showing that the human capacity to sense the regularity of beats becomes inaccurate when the duration between beats is slower than 2 seconds or faster than 200ms. By entraining to beat hierarchies, we are able to perceive metric configurations up to 6 seconds and down to 100ms.[5] Still uncertain is our ability to truly focus on two different beat streams simultaneously. Despite this, Baumbusch has intentionally composed music using such lengthy and layered temporal arrangements, encouraging us to learn to perceive these musical structures. In pairing with the ensemble Nata Swara, it seems that Baumbusch's hunch was right, because of 1) the high frequency of music-making in the lifestyle of the Balinese ritual calendar; 2) the holistic conceptions of musical structures learnt by playing the tightly organised strata of Balinese traditional music; and 3) the social unity created by Balinese musicians' collectivist sensibilities and its power to strengthen their ensemble performance; these players have developed the musicianship to perform Baumbusch's music with near-perfect synchrony and sensitivity.

Baumbusch's vision is of a music that simultaneously engages with many different beat groupings. Tracking the last decade of his temporal organisation experiments, we can learn how Baumbusch's ideas developed from what we might call polyrhythm into a more expansive concept of polytempo. In Movement 6 of the 2014-15 composition *Mikrokosma* (collaboratively composed with Wayne Vitale), Baumbusch calls for the stacking of pulse groups of prime numbers 3, 5, and 31, requiring a very long macro-period of 465 pulses—the lowest common multiple of the three primes—before the pulse groups

[3] For the list of all compositions Harrison wrote for gamelan instruments, see Arms, Jay and Diamond, Jody. "Compositions for Gamelan by Lou Harrison." *Balungan* 12: 37–38, 2017. Many thanks to Jody Diamond for sharing her deep knowledge on all things Lou Harrison and gamelan.

[4] Putu Septa has since used the instruments in his own compositions and for performing traditional Balinese repertoire.

[5] See London, Justin. *Hearing in Time*. 2nd ed. New York: Oxford University Press, 2012.

coincide. Baumbusch pushed yet further toward complex temporal simultaneities in his 2020 composition, *Isotropes*, which features a section with two simultaneous melodies, one at 50 beats per minute (BPM) and one at 51 BPM. That's a difference in rate of just 24ms, too small for humans to discriminate. And the massive, implied grid of 2550 pulses would require, even at extremely slow tempi, a mammoth feat of memory to pull off. Thus, to "perform" *Isotropes*, the musicians must listen to separate click tracks, blissfully unaware of the complexity that their parts generate together. From an experiential perspective, these two temporal arrangements present quite different challenges, the latter giving rise to the term *polytempo*, which describes the different order of magnitude in which a 50:51 beat configuration belongs.

***Prisms for Gene Davis* (2018–2021)**

The first piece, *Prisms for Gene Davis*, is the most recent work on this album, composed exclusively for the Gen 2 instruments. The piece is divided into nine sections or "prisms," named for their geometric dimensions. Moreover, *Prisms for Gene Davis* can be thought of as a refraction of Baumbusch's relationship to both American Minimalism and Balinese music.

Though the piece's title evokes the work of the minimalist color field painter Gene Davis, *Prisms for Gene Davis* stands apart from many works in the minimalist music canon, pioneered by such composers as Terry Riley, Philip Glass, and Steve Reich. With experience performing the music of Glass and Reich, Baumbusch is caught between this world and the world of Balinese music, music he has taught since 2014 and played since before that. While at face value the driving pulse sustained throughout *Prisms for Gene Davis* seems to share similarities with Reich's short, melodic-rhythmic cells (chosen because they do not detract focus from the systematic processes towards which Reich wishes to draw our attention), Baumbusch, feeling more closely in dialogue with Balinese musical

forms, calls us to attend to time scales far longer than Reich's punchy grooves.

Indeed, much classical Balinese music (most notably *lelambatan* and *legong* repertoire)[6], presents melodies at sometimes drastically protracted time scales, such as the form *tabuh kutus*, with its 512-note (i.e., 512-beat) melody. Sometimes these are so long that many people, unless attending carefully to signalling gong strokes along the way, may barely notice that repetition has occurred. *Prisms for Gene Davis* engages with such lengthy time scales, and uses Balinese structures to do so, especially in its consideration of melodic design according to the Balinese principles of *ngubeng* (stasis) and *majalan* (walking, moving). These inform melodic motion, balance, contour, and the relationship between melodies in different metric and textural strata.[7]

Each "prism" is based on a sequence of 12 skeletal melody tones (heard in the lowest-pitched instruments in any given movement) that are proportioned differently in each movement, thus creating a variety of "musical polyhedrons." These are summarised in the table below; the left three columns on page 11 show how these melody tones are configured and the resulting cycle proportions.

[6] Tenzer defines *lelambatan* as "a family of classical instrumental compositions performed primarily in temple[s] to entertain visiting deities." Tenzer, Michael. *Balinese Gamelan Music*. 3rd ed. Singapore: Tuttle. *Balinese Music*, 2011, p.175. *Legong* is a classical dance drama form with an associated musical repertory.

[7] See Tenzer, Michael. *Gamelan Gong Kebyar: The Art of Twentieth-Century Balinese Music*. Chicago: Chicago University Press, 2000.

	Pitch collection	Speed	Tempo
Prism 1 (Tetra)	mode: 13457	fast	135bpm
	1 — 7 — 7 — 4 — 3 — 3 — 4 — 7 — 5 — 4 — 5 — 3 — (1)		
Prism 2 (Penta)	mode: 12456	slow	quintuplets at 30bpm
	5 — 4 — 4 — 2 — 1 — 1 — 6 — 4 — 2 — 5 — 2 — 6 — (5)		
Prism 3 (Hexa)	mode: 14567	fast	120bpm (kajar every 3 beats)
	1 — 7 — 7 — 5 — 4 — 4 — 6 — 7 — 6 — 5 — 6 — 4 — (1)		
Prism 4 (Tetra)	mode: 12357	medium	90bpm
	1 — 3 — 3 — 3 — 2 — 2 — 3 — 7 — 5 — 3 — 5 — 2 — (1) x2		
Prism 5 (Hepta)	mode: 12356	fast	quintuplets ~100bpm, septulets at ~70bpm
	6 — 1 — 1 — 3 — 2 — 2 — 3 — 6 — 5 — 1' — 3 — 5 — (6) x2		
Prism 6 (Penta)	mode: 1234567	slow-medium	30-70bpm, tempo *ombak* (fluctuations)
	2 — 6 — 6 — 1 — 3 — 5 — 5 — 7 — 4 — 6 — 5 — 2 — (2) x2		
Prism 7 (Hexa)	mode: 12456	medium	88bpm (kajar every 3 beats)
	4 — 5 — 5 — 2 — 5 — 6 — 1' — 1 — 2 — 4 — 6 — 5 — (4) first and third time **4 — 5 — 5 — 6 — 1 — 1' — 6 — 5 — 2 — 4 — 1' — 2 — (4) second time**		
Prism 8 (Tetra)	mode: 13457	fast	120bpm
	1 — 7 — 7 — 4 — 3 — 3 — 4 — 7 — 5 — 4 — 5 — 3 — (1) x2		
Prism 9 (Nona)	mode: 1234567	fast	quintuplets at ~100bpm, triplets at ~163
	7 — 6 — 5 — 7 — 4 — 2 — 2 — 4 — 1' — 6 — 5 — 6 — (7) x2		

Separation of 12 core tones	Beat configuration, based on kajar	Total cycle length in fastest pulses	Notable features
every 32 pulses	8 x 4-pulse beats	384	Original 2018 version for quartet, original orchestration maintained for this movement only.
every 30 pulses	6 x 5-pulse beats	360	The kendang parts in this movement use the grammar of traditional parts, but they are warped here by the unusual meter. A matching but idiomatic kajar part was improvised by Yande
every 48 pulses	4 x 12-pulse beats	576	First movement with reong, here played by 4 players
every 32 pulses	8 x 4-pulse beats	384	Same as Prism 1 but in different mode, drumming adapted from standard *pelegongan pengecet* drumming parts. Reong used as a solo trompong here, played by Janurangga.
every 70 pulses	14 x 5-pulse beats, 10 x 7-pulse beats	840	First mvt with full instrumentation. Structural parallelism with prism 9. Trompong melody configured to a 7:5 polyrhythm. Kajar plays 5s on the first rep, 7s on the second rep.
every 30 pulses	6 x 5-pulse beats	360	First and second repetitions have opposite tempo profiles (1:med-slow-med; 2:slow-med-slow), so the melody is experienced differently between the two cycles
every 48 pulses	4 x 12-pulse beats	576	The drumming parts in this movement were adapted from the traditional *Semar Pegulingan* repertoire items *Sumambang Jawa* (standard *pengawak legong* drumming) and *Legong Saba*
every 32 pulses	8 x 4-pulse beats	384	Same as Prism 1 but with reong and kendang. Nata Swara's leader, Putu Septa, improvised the part played on the aluminium gender.
every 90 pulses	shifting sequence of 3-pulse and 5-pulse beats	1080	Inspired by Gene Davis's *Raspberry Icicle* (1967); trompong melody configured to a 9:5 polyrhythm. Kajar plays an irregular sequence of 3-, 5-, and 9-pulse beats whose order is reversed for the second repetition

Executing this piece indeed took full advantage of the special Balinese sensitivities to long time scales. This can be felt especially in the final movement, *Prism 9 (Nona—"Raspberry Icicle")*, composed several years after the previous movements following Baumbusch's continued experimentation with polytempo music. As shown in the third column, each core melody tone is placed 90 pulses apart. Corresponding to 11 seconds of clock time (well beyond beat lengths that are entrainable) between each of the 12 tones, and taking more than two minutes for the full sequence to repeat, these periods beckon the listener's keen focus and attention. Performing such a stretch of durational perception demands the holistic awareness that most Balinese musicians have of how one's part fits into the complete musical texture and hierarchy.

Inspired by the off-the-grid feeling of rhythmic freedom that he discovered in polytempo music, Baumbusch composed a series of soaring melodies for the *trompong*.[8] The durations between notes of this solo instrument's melodies are governed by various polymetric cycles. Take, for instance, the *trompong* melody of *Prism 5 (hepta)*, which uses a 7-against-5 grid as the basis for its durations, or the 9-against-5 used in *Prism 9 (Nona)*; these sections achieve their floating qualities by using irregular sequences of durations afforded by these complex cycles to create a durationally unpredictable melody.

Here the prodigious skills of ensemble director Putu Septa and *trompong* player Kadek Januarangga, both coaching the other players and playing, must be appreciated. To teach Baumbusch's music to his ensemble, Septa "translated" Baumbusch's notation into a form that could be interpreted by Nata Swara's musicians: embodied oral teaching that conveys much more than just the notes and rhythms on a printed page. Supplementing this, some of the musicians learnt (from Septa) to read staff notation just for this project.

Reprinted on the back cover of the booklet is Gene Davis' 1967 abstract expressionist painting *Raspberry Icicle* after which *Prism 9* is named. Davis commented on the large canvas of this painting saying: "I was doing big, big work… I equated that with

quality, bigness with quality."[9] The expansive time proportions of *Prisms* and their densely-packed grids is the aesthetic parallel to the Davis' irregularly coloured bars that totally fill the canvas.

***Three Elements for String Quartet* (2016)**

Three Elements is one of Baumbusch's earliest endeavors in composing with polytempo structures. The format of the three movements requires that the performers use individual click tracks in the first and third movements in order to execute the polytempo relationships in the music, and in the middle movement the ensemble is free from "clock time" and can interpret the rhythms communally. The first movement, "Helium," uses four shifting click tracks to conjure the erratic densities of bouncing gas molecules by oscillating between states of tempo divergence (different simultaneously moving tempi) and convergence (stable or unison tempi), a common theme in many of Baumbusch's polytempo works. The chorale-like second movement, "Lithium," uses various extended timbral effects, with chunks arranged in a way that is inspired by indeterminacy techniques developed by John Cage. The final movement, "Mercury," begins helter-skelter, with the first violinist racing along at 150 BPM, the fastest of a 10:9:8:7 tempo relationship with the other three players, creating a dense and unparseable texture. Within less than a minute, these four tempi gradually converge on a single unison tempo that slows down and speeds up like a paper plane swooping on an air current, occasionally jumping instantly to a new tempo. The movement continues to oscillate between states of divergence and convergence before ending in a quiet cacophony.

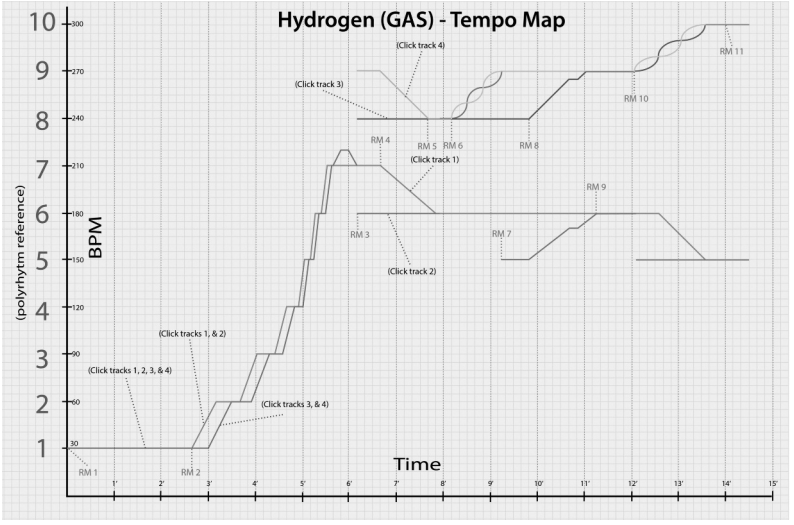
[8]An instrument comprised of a row of *pencon*, typically played by a soloist.
[9]Smithsonian American Art Museum. "Raspberry Icicle." https://americanart.si.edu/artwork/raspberry-icicle-6322

***Hydrogen(2)Oxygen* (2015)**

This work, the earliest on this album, was Baumbusch's first polytempo piece, and explores the unique tuning landscape that is created by combing Baumbusch's Lightbulb instruments with string quartet. Having previously written a piece combining gamelan and string quartet, *Bali Alloy* (2012), Baumbusch decided to reconsider the approach to tuning for *Hydrogen(2)Oxygen*. *Bali Alloy*, which was premiered by the JACK Quartet and I Made Bandem's Gamelan Makaradhwaja at the 2012 Bali Arts Festival, demanded of its performers extreme attention to microtonal tuning in order for the string quartet to match the pitches of that particular set of Balinese gamelan instruments. *Hydrogen(2)Oxygen*, inspired in part by Michael Tenzer's 2006 work *Underleaf*,[10] takes into consideration the irreconcilability of its two sound worlds, i.e. the harmonic overtone series naturally produced by the string instruments and the inharmonic series of partials of the steel and cedar bars contained in the Lightbulb instruments.

The combination of these two worlds is laid bare in the first movement, "Hydrogen [Gas]," when Baumbusch does not attempt to unify the two sound worlds at all. The hovering and luminous open strings and natural harmonics of the string quartet and the fluorescent hum of the Lightbulb instruments' acoustic beating and inharmonic partials are simply allowed to hang together in space, sometimes overlapping with jarring colours. At glacial speed, the Lightbulb instruments play the symmetrical sequence of eight notes that is to be the central melodic strand of the entire work: G-F-C-F-G-B-E-B.

A parallel between this and *Three Elements* is that the ensemble uses click tracks in the first and third movements but not in the second, and the first movements of both pieces restrict the string quartet to open strings and natural harmonics. Baumbusch, having resorted to the use of click tracks in these two works, felt the need to justify the use of this technology (which can have the stigma of being a crutch), by using the click tracks to realise polytempo music that could not be performed otherwise.[11] As such, the first movement has no standard score because the vertical relationships in time between the multiple instruments are too complex to be shown in standard notation. Instead of a score, Baumbusch organises the four instrumental groups on a time/tempo graph, reproduced below: clock time on the x-axis and BPM on the y-axis, with numbers that help to read the ratios between tempi.



[10] This piece can be heard on *Michael Tenzer: Let Others Name You* (New World Records 80697, 2009).

[11] For more discussion of click tracks, see Smith, Oscar. *Brian Baumbusch: Effigy*. Liner notes. Other Minds Records OM 1032-2.

Hydrogen(2)Oxygen's first movement begins with a process already underway. The strings and later a quartet of *pencon* (beginning at 2'40") play rhythms that correspond to the tail end of a gargantuan stack of primes: 17/13/11/7. This particular combination of beat groupings generates a 17,017-beat-long cycle, which, at this tempo, would take 9 hours, 27 minutes, and 13 seconds to complete, if played from its actual beginning. Slowly, limping ostinati take shape and accelerate until finally arriving at the resolution point of this polyrhythm, coordinated to finish at exactly 6'10", at which point the full ensemble enters and splits into four different quartets of instruments in a 9:8:7:6 (270bpm:240bpm:210bpm:180bpm) tempo relationship, ironically giving a sense of momentary stability. One can hear several curved and plateaued tempo organisations, creating spiralling effects like the visual strobing of car wheel rims on a highway. The movement closes with an extremely fast and tightly interlocked pattern shared by four musicians. Here again, the interlocking mastery of the Balinese musicians can be appreciated: They are coordinating with only ~67 milliseconds between attacks (900bpm).

The second movement begins to bring the two timbral worlds together, with the percussion's murky murmurs and the string quartet's glassy strands slowly overlapping and then emerging into restless unison lines like those of the Balinese genre *kebyar*.[12] Warmer harmonies are sometimes used but then pushed aside with tenser ones; sudden accented notes still don't allow the two ensembles to settle comfortably. Towards the end of the movement, Baumbusch uses string harmonies that he constructed from the notes of the percussion instruments' partials, thus better matching the harmonic instruments' pitch material with the timbres of the Lightbulb instruments. The core pitch sequence of G-F-C-F-G-B-E-B makes a cameo as a quasi-*kebyar* melody, obscured by its rhythmic irregularity.

The third movement finally presents the above pitch sequence in a tempo at which we can appreciate its shape. The percussion ensemble is segmented into four groups

that each play at designated rates of a 9:8:7:5 polyrhythm. This generates a macro-period of 2520 beats, a significant number as will be described below. Helping to demarcate this long cycle are the gongs, which sound every time three of those pulse-groups align. The greater significance of these moments is akin to the 210-day traditional Balinese calendar (*pawukon*) which places any significant cultural or religious event on days where multiple different-sized "weeks" align. The 2520-beat macro-period of *Hydrogen(2)Oxygen*'s final movement is 12 times the length of the *pawukon*, 12 being the number of gamelan parts for which this movement is scored. The gongs are like the auspicious day *Galungan* (Baumbusch was recording this album in Bali on the cusp of this festival time), held on the coincidence of the two most important week lengths: the 5-day and the 7-day week (*Buda Keliwon*). Orchestrating these overlapping cycles, Baumbusch highlights different sections of the ensemble by selecting them to play rapid interlocking figurations of the core melody inspired by the Balinese technique *norot*,[13] but in their respective pulse groupings. The movement ends after exactly 2520 pulses, but leaves us eternally hanging, withholding the next "one," the final coincidence of the four beat groupings that would resolve this cycle.

This album is the work of a diligent composer who has travelled deep down many rabbit holes (instrument building, tuning, spectral analysis, tempo technology, Balinese compositional techniques, and even microphone building [much of the recordings on this album were captured on microphones that Baumbusch built himself]) to

[12] "*Gamelan Gong Kebyar* is a Balinese gamelan ensemble that developed in the 20th century and became a standard gamelan across the island. It is now used in both secular and sacred contexts, and it is known for its virtuosity and "explosive" style." (Tenzer, 2011; Tilley, 2019)

[13] Leslie Tilley defines *norot* as "A style of melodic elaboration or figuration used in *gamelan gong kebyar* that features an oscillation between the current core melody (*pokok*) tone and its scalar upper neighbor, and anticipates each new *pokok* tone with a 3-note pickup gesture." Tilley, Leslie A. *Making It Up Together: The Art of Collective Improvisation in Balinese Music and Beyond.* Chicago: University of Chicago Press, 2019, p.287.

learn the technical information needed to engage with these complex compositional worlds. He has resurfaced from these explorations with a sensitive and refined fusion that can be heard here.

—Oscar Smith, February 2023

Oscar Smith is an Australian ethnomusicologist, composer, and musician. Currently a PhD student in Ethnomusicology at the University of British Columbia, Oscar's primary research interests are the contemporary composition scene in Bali, Indonesia, and how gamelan ensembles synchronise in time.

Composer, instrument designer, and musicologist **Brian Baumbusch**'s work, while innovative within the global contemporary music community, is deeply in dialogue with cross-cultural exchanges. Born in 1987, Baumbusch's compositional work is centered on developing alternative acoustics paradigms through the creation of new instruments and tuning systems, and originating new performance practices that feature computer-assisted live performance and recording projects in order to achieve performances of inconspicuously complex polytempo music.

Between 2007 and 2010, Baumbusch was deeply engaged in ethnomusicological field work centered on Argentine-Quechua folklore music. From 2012 to the present, Baumbusch has collaborated with several of Bali's leading performing ensembles, and his works have been premiered at the Bali Arts Festival.

At the advent of the COVID-19 pandemic, Baumbusch began creating new compositions that performers could collaborate on remotely by recording in isolation to individualized click tracks in order to cooperatively create complex polytempo structures. These include the symphonic length *Isotropes*, recorded by roughly 150 musicians between 2020 and 2021, and the evening length *Polytempo Music*, designed as a VR experience

where the listener can interact with the music in a real-time spatial audio environment.

Baumbusch resides in Alameda, CA. and teaches at the University of California, Santa Cruz.

Comprising violinists Christopher Otto and Austin Wulliman, violist John Pickford Richards, and cellist Jay Campbell, **JACK Quartet** is an experimental string quartet that champions music by 20th- and 21st-century composers. Through intimate relationships with today's most creative voices, JACK embraces close collaboration with the composers they perform, leading to a radical embodiment of the technical, musical, and emotional aspects of their work. The quartet has worked with such artists as Julia Wolfe, George Lewis, and Helmut Lachenmann, with upcoming and recent premieres including works by John Luther Adams, Catherine Lamb, Liza Lim, Tyshawn Sorey, Wadada Leo Smith, Amy Williams, and John Zorn. Committed to education, JACK is the Quartet-in-Residence at the Mannes School of Music, where they provide mentorship to Mannes's Cuker and Stern Graduate String Quartet. The quartet was selected as *Musical America*'s 2018 "Ensemble of the Year," nominated for GRAMMY Awards for recordings in 2018 & 2022, named to WQXR's "19 for 19 Artists to Watch," and awarded an Avery Fisher Career Grant.

Nata Swara is an art community that focuses on the explorations of traditional and contemporary gamelan music. The repertoire commissioned and performed by Nata Swara offers young gamelan musicians and composers the opportunity to explore new musical directions at the highest level. Nata Swara was established in 2011, in Padangtegal village, Ubud, Bali, which still serves as its home base. Nata Swara performs on a variety of different sets of gamelan instruments, including Gamelan Sada Sancaya, a large orchestra of extended range bronze instruments designed by Putu Septa; two sets of instruments cre-

ated by American composer Brian Baumbusch; and a newly developed instrument set consisting of a varied collection of Balinese *kendang* drums called *Kendang Briuk*, for which Nata Swara has commissioned several new works. Nata Swara actively engages in deepening the well of repertoire of both traditional and contemporary gamelan music, while collaborating with musicians and composers from within Bali and abroad.

I Putu Adi Septa Suweca Putra (Putu Septa) is a contemporary Balinese composer and performer, and the founder and artistic director of Nata Swara, an art community and performing ensemble located inside Padangtegal Village in Ubud, Bali. Septa actively composes diverse styles of music that connect local and international musicians with both traditional and newly designed instruments. As a performer, Septa is a senior member of Gamelan Salukat, led by Balinese composer Dewa Alit. As a musician and a gamelan teacher, Septa is engaged in artistic cultural activities with many diverse communities. As a teenager, Septa founded a children's gamelan club for children aged five to twelve in his village. Many of those young students have matured to become part of his ensemble Nata Swara, and several of them have gone on to join Gamelan Salukat. His compositions include instrumental music with diverse instrumentations involving both Indonesian and global instruments, collaborations with dance choreographers, music for film, and experimental electronic music, among others. His devotion to traditional gamelan music started from childhood, when he drew inspiration from his grandfather, I Ketut Genjet, whose role as a musical leader in his community was an inspiration to Septa. Septa regularly performs and tours with Gamelan Salukat, Gamelan Yuganada, and Shangrila. He holds a degree in music composition from ISI Denpasar, and resides in Ubud, Bali.

Prisms for Gene Davis
Nata Swara

Musical Director: I Putu Adi Septa Suweca Putra (Putu Septa)

Performers:
I Kadek Agus Cahaya Suputra (Agus)
I Kadek Janurangga (Otok)
I Kadek Krisna Arimbawa (Dede)
I Kadek Prima Santosa Dwi Putra (Prima)
I Kadek Putra Agustina (Dektra)
I Ketut Darmawan (Bencol)
I Made Agus Wiyana (Ade)
I Made Reindra Dwipayana (Reindra)
I Nyoman Adi Januarta (Mang Adi)
I Putu Adi Septa Suweca Putra (Putu Septa)
I Putu Astianawan (Liong)
I Putu Daniswara (Dani)
I Putu Suta Muliartawan (Jo)
I Wayan Ariadi (Ariadi)
I Wayan Eka Sutawan (Eka)
I Wayan Gede Margiarta (Yande)
I Wayan Sudibya (Dibya)
I Wayan Sumerta (Nana)
Kadek Krisna Ripayana (Dekna)
Made Dwi Cahya Diva (Degus)

Three Elements for String Quartet
JACK Quartet

Austin Wulliman, violin 1; Christopher Otto, violin 2; John Richards, viola; Jay Campbell, cello

Hydrogen(2)Oxygen
JACK Quartet & Nata Swara

Musical Director: Brian Baumbusch

Nata Swara:
Brian Baumbusch
I Kadek Agus Cahaya Suputra (Agus)
I Kadek Janurangga (Otok)
I Kadek Krisna Ripayana (Deknya)
I Kadek Putra Agustina (Detra)
I Made Reindra Dwipayana (Reindra)
I Putu Adi Septa Suweca Putra (Kuprit)
I Putu Suta Muliartawan (Jo)
I Wayan Eka Sutawan (Eka)
I Wayan Gede Margiarta (Yande)

JACK Quartet
Christopher Otto, violin 1; Austin Wulliman, violin 2; John Richards, viola; Jay Campbell, cello

SELECTED DISCOGRAPHY

Brian Baumbusch
Effigy. Other Minds Records OM 1032.
Murmuration. Other Minds Records OM 2029.

w/ Wayne Vitale
Mikrokosma. New World Records 80785.

Other Gamelan titles on New World Records
American Works for Balinese Gamelan Orchestra. New World Records 80430.
Barbara Benary. *Sun on Snow*. New World Records 80646.
Jody Diamond. *In That Bright World*. New World Records 80698.
Lou Harrison. *Scenes from Cavafy*. New World Records 80710.
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Evan Ziporyn. *Gamelan Galak Tika*. New World Records 80565.

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Producers: Brian Baumbusch, I Putu Adi Septa Suweca Putra (Putu Septa)
Audio Engineers:
Prisms for Gene Davis: Brian Baumbusch; I Putu Gede Sukaryana (Balot)
Three Elements for String Quartet: Ryan Streber
Hydrogen(2)Oxygen: Brian Baumbusch; I Kadek Prima Santosa Dwi Putra (Prima); I Putu Gede Sukaryana (Balot); Ryan Streber
Audio Editing and Mixing: Brian Baumbusch
Digital mastering: Paul Zinman, SoundByte Productions Inc., NYC
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Nata Swara recording *Prisms for Gene Davis* at Sanggar Nata Swara in Ubud, Bali, January 2022.
Photo by Brian Baumbusch.