Curatorial > INTERRUPTIONS

This section proposes a line of programmes devoted to exploring the complex map of sound art from different points of view organised in curatorial series.

With INTERRUPTIONS we make the most of the vast musical knowledge of the artists and curators involved in the Ràdio Web MACBA project, to create a series of 'breaks' or 'interruptions' in our Curatorial programming. In à-la-carte-music format, our regular curators have carte blanche to create a purely musical experience with only one guiding parameter: the thread that runs through each session must be original and surprising. The mix presented by Marcus Schmickler revises some of the thrilling contemporary musical works utilizing a notion of mathematics and number. They represent what could be called perceptive or sensual mathematics.

Curated by Marcus Schmickler

PDF Contents:

Marcus Schmickler is a key figure in German experimental contemporary music. While rooted in electronic music, Schmickler has a background in classical composition, having studied under the prominent Stockhausen collaborator Johannes Fritsch. Schmickler has worked in a variety of different styles negating genre borders between computer music, contemporary and pop music. His long-standing collaborative projects include most notably those with synth wiz Thomas Lehn, MIMEO, and pianist John Tilbury. His work revolves around as broad and fundamental questions as where music comes from and what music can be, more recently using sonifications as a method of possible epistemological exchange between the sciences and the arts.
www.piethopraxis.org

INTERRUPTIONS #6

Ontology of vibration: economics, music and number

The mix presented here revises some of the exciting contemporary musical works utilizing a notion of mathematics and number. These compositions represent what could be called perceptive or sensual mathematics.

01. Summary

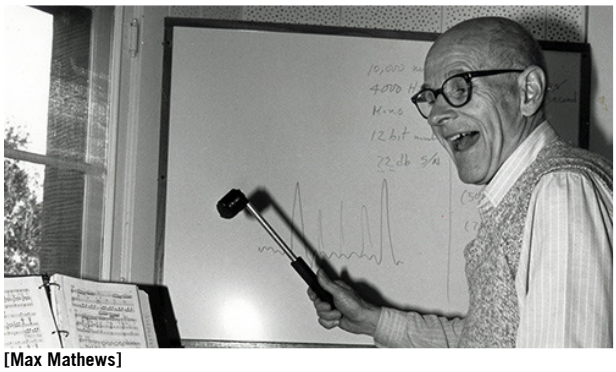
Is it possible to approach developments in music by its relationships with money? Can we gain insight into societies by means of their relationship to music? Music serves as a mirror, as a prophecy for society because it reflects developments faster than anything that materializes.[1]

There is an obvious simultaneity between music and economical developments, between music and mathematics and between mathematical and economical relationships. How better could we navigate through these dichotomies than through number, their common foundation? Ultimately, while we look at the connections between both number and music, how does music and its matter, frequency, correspond to (an ontology of) number? This mix revises some of the more recent musical works explicitly drawing from mathematics and number. But what are numbers and what should they be?[2]

The necessity to bring numbers into an order, to calculate, does perhaps have its origin in the beginnings of the abstraction of trade. A simple example: two farmers are trading seventeen geese versus five sheep. The sheep owner has temporally enough geese but is still willing to give away the sheep. Before the introduction of money, trust was an important factor. The farmer could still give away the sheep, anticipating that he will receive the seventeen geese whenever he will need them. Modern economics, dealing with consumption, capital, debt and interest as forms of symbolic reproduction, relies on psychological factors such as trust, speculation and rhetorics. Thus, many of the foundational economic theories come from moral philosophy rather than from mathematics.[3]

In his book *Number and Numbers*, Alain Badiou sets out how numbers 'serve, strictly speaking, for everything, they provide a norm for All. […] Number governs our conception of the political, […] of suffrage, of opinion polls, of the majority. […] What counts, in the sense of what is valued, is that which is counted. Conversely, everything that can be numbered must be valued. […] Political thought is numerical exegesis. […] Number governs the quasi-totality of the 'human sciences'.' Badiou asks: 'Isn't another idea of number necessary, in order for us to turn thought back against the despotism of number, in order that the subject might be subtracted from it? And has mathematics simply stood silently during the comprehensive social integration of number, over which it formerly had monopoly? […]. In our situation, that of Capital, the reign of number is thus the reign of the unthought slavery of numericality itself. […] The reverse side of the abundance of capital is the rarity of truth, in every order where truth can be attested to: science, art, politics and love.'[4]

As early as the time of the Pythagoreans, a concept of number for a harmonic relationship between mathematical and musical proportions as constitutional element for an ontology of the cosmos was acknowledged.[5] This idea of music is based on the fact that simple proportions would create the most harmonic intervals from the vibration of a string (½ string length as octave to the fundamental, ⅔ as fifth, etc.). In essence, 2000 years of musical history have revolved around the problem of how to numerically minimize an array of paradoxes arising from the desire to make music with multiple fundamentals (or multiple 'Ones').


[Max Mathews]

Around the period of the Pythagoreans, there was an early second strand in philosophy that we could call the strand of becoming and change as formulated by Heraclitus and Lucretius.[6] In the twentieth century, Ilya Prigogine and Isabelle Stengers illuminated the history of dynamics, the mathematics of physical change.[7]

Interestingly, it is the problem of the continuum, the dialectic of the discrete and the continuous, which, saturating and subverting the ancient opposition between arithmetic and geometry, compelled mathematicians around the second half of the nineteenth century to rethink the idea of number. The question remains: is there a concept of number capable of subsuming, under a single type of being, answering to a uniform procedure, at least natural numbers, real numbers and ordinal numbers, whether finite or infinite?[8]

In 1888 in *Was sind und was sollen die Zahlen?* (What are numbers and what should they be?) Richard Dedekind wrote that a generalization of numbers can be approached by regarding the different number classes as parts of sets. Revising Dedekind, Alain Badiou lists three fundamental causes that mark the collapse of the Greek thinking about numbers: first, the irruption of the problem of the infinite; second, the ontological problem of number, zero, the void; and third, the dislocation of the idea of the One. 'We find ourselves under the jurisdiction of an epoch that obliges us to hold that being is essentially multiple. Consequently, number cannot proceed from the supposition of a transcendent being of the One.'[9]

Like other philosophers before him, Badiou also relies on mathematics as a crucial condition for his philosophical exploration. By discussing the concept of Conway's 'surreal number',[10] he aims to 'limit the glory of number to the important, but not exclusive, glory of being, and thereby demonstrating that what proceeds from an event in terms of truth-fidelity can never be, has never been, counted.' The surreal numbers describe an arithmetic continuum containing the real numbers as well as all infinite and infinitesimal numbers respectively larger and smaller than any real numbers. In set theory, surreals are the largest possible ordered field; all other ordered fields, such as the rationals, the reals, the rational functions, the superreal numbers, and the hyperreal numbers, are subfields of the surreals. Surreals also contain all transfinite ordinal numbers reachable in the set theory in which they are constructed. 'We therefore find the program of unification of the concept of Number (one sole concept which subsumes the natural whole numbers, the negative whole numbers, the rationals, the reals and the ordinals) to be wholly realized, firstly in multiple-being, and then in the operational dimensions.'[11]

How does this specific notion of Number mirror into the swirling nature of music? In preparation of a new piece, incorporating sonifications of Badiou's Number,[12] the mix presented here revises some of the exciting contemporary musical works addressing the predominant notion of mathematics and number, representing what could be called perceptive or sensual mathematics.

[1] See Jacques Attali, *Noise: Political Economy of Music, Theory and History of Music*. Minnesota: University of Minnesota, 2008.
[2] Richard Dedekind, *Was sind und was sollen die Zahlen?*, 1888.
[3] See for example Adam Smith, *An inquiry into Nature and the Causes of the Wealth of Nations*. Munich: IDION-Verlag, 1976.
[4] Alain Badiou, *Number and Numbers*. Cambridge: Polity Press Cambridge, 2008. First published in French *Le Nombre et les Nombres*. Editions du Seul, 1990.
[5] Kurt von Fritz, 'Pythagoras of Samos', in *The Dictionary of Scientific Biography*. New York, 1975
[6] See Michael Serres, "Lucretius: Science and Religion" in Hermes: Literature, Science, Philosophy, Johns Hopkins University Press, Baltimore, 1982
[7] Ilya Prigogine and Isabelle Stengers, 'Postface: Dynamics from Leibnitz to Lucretius' in *Hermes: Literature, Science, Philosophy*. Baltimore: Johns Hopkins University Press, 1982.
[8] Alain Badiou, *Number and Numbers*.
[9] Ibid.
[10] James H. Conway, *On Numbers and Games*. London: Mathematical Society Lecture Note Series 110, Cambridge University Press, 1986. Note: Alain Badiou calls the surreal number 'Number'.
[11] Alain Badiou, *Number and Numbers*.
[12] Marcus Schmickler, Julian Rohrhuber et al., *Politics of Frequency*. Cologne: WDR, 2011.

[Pietro Grossi *Combinatoria*, 2010]

02. Playlist

Francisco Guerrero 'Coma Berenices', *Complete Orchestral Works*, 2003 (Collegno) James Tenney 'Spectral Canon for Conlon Nancarrow', *Cold Blue*, 1984 (Cold Blue Music)
Tom Johnson 'Multiplication Table', *Music for 88*, 1992 (XI)
Max Mathews 'Numerology', *Music from Mathematics*, 1962 (Decca)
Pietro Grossi 'Collage', *Musicautomatica*, 2008 (die Schachtel)
Tom Johnson 'Pascal's Triangle', *Music for 88*, 1992 (XI)
Gerhard Rühm 'Pencil Music', *Pencil Music*, 2002 (? Records)
Iannis Xenakis 'Épéi for Ensemble', *Palimpsest / Épéi / Dikthas / Akanthos*, 1990 (Wergo)
Ryoji Ikeda 'Headphonics 0', *+/-* , 1996 (Touch)
Iannis Xenakis 'Mycenae Alpha', *Electro Acoustic Music: Classics*, 1990 (Neuma Records)
Tom Johnson 'Euler's Harmonies', *Music for 88*, 1992 (XI)
Horatiu Radulescu 'Streichquartett Nr. 4 Opus 33', Horatiu Radulescu – Arditti String Quartet *Streichquartett Nr. 4 Opus 33*, 2001 (Edition RZ)
Jean-Claude Risset 'Catalogue of Computer Snythesized Sounds', *Computer Music Currents 13*, 1995 (Wergo)
Julio Estrada 'Eua-On-Ome', *CCMIX: New Electroacoustic Music from Paris*, 2001 (Mode)
Tom Johnson 'Abundant Numbers', *Music for 88*, 1992 (XI)
Alois Hába 'Quartett Nr. 7 Op. 73 (1951) 'Weihnachtsquartett'', *Streichquartette – Gesamtaufnahme*, 2006 (Bayer)
Arnold Dreyblatt and the Orchestra of Excited Strings 'Odd and Even', *Propellers in Love*, 1986 (Künstlerhaus Bethanien)
Tony Conrad 'Pythagoras Refusing to Cross the Bean Field at his Back, is Dispatched by Democrats', *Slapping Pythagoras,* 1995 (Table of the Elements)
Arcane Device 'Six + Four, at the Clocktower New York City', *Six+Four, 1999* (Korm Plastics)
James Tenney 'For Ann (Rising)', *Selected Works 1961-1969*, 1992 (Frog Peak Music)
Tom Johnson 'Organ & Silence', *Music for 88*, 1992 (XI)
James Tenney 'Stochastic String Quartett', *Quatuor Bozzini – Arbor Vitæ, 2008* (qb)
Ryoji Ikeda 'The Transfinite', 2011 (unreleased)

03. Credits

Curated and produced by Marcus Schmickler.

04. Acknowledgments

Thanks to all the featured artists. Special thanks to Julian Rohrhuber, Heike Sperling and Robert Taylor.

05. Copyright note