

Hypermusic Experiment 0.9: [modelling, mapping, and prototyping the future...]

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- Introduction
 - Overview, why notation?
- Differential ontology and other background
 - DM, GM and UF, bridge: planes
- Outline of a prototype: Hypermusic Experiment 0.9
 - System architecture
 - Spectral Interactions in the Notation-Machine
 - Implementing Hypermusic Experiment 0.9 as a DAO: Empowering Performers through Decentralization
- Further exploration, AI and conclusion

Introduction

General (this article)

Why notation? (contra-raw audio, determined frequency (pitch), link to (human) performance practice) –

Blockchain?

Embarking on a journey into the realm of music generation, the Hypermusic Experiment 0.9 proposes an innovative system that goes beyond traditional boundaries. It reimagines the creative process, introducing a novel mechanism and spectra interaction to generate notated music, ultimately aiming to explore an ever-evolving, fluid, nonlinear, decentralized and a participatory musical landscape which is highly contingent upon its interaction with various elements, from the performer's interpretation to societal and cultural shifts.

The Hypermusic system envisaged initiates its process by generating notated/inscribed pages, here called partial-scores (as artifacts). These pages, laden with an assortment of musical graphics, are the basic units of our compositional system. Furthermore, they aim to function as non-linear, decentralized, and multiple, as a multipiece, signifying an infinity of possible musical pieces, unending and ongoing. Importantly, in its initiation it is already a multiplicity, already a hybrid of digital and physical dimensions, of virtual and actual elements. As such it does not have a beginning either.

This essay delineates this system/experiment that aims to operate as an infinite notation-machine. Before outlining the system, I will trace my creative path to both contextualize the proposed experiment, outline the reasons behind and argue for the particular functioning of the model.

The notation-machine, takes the machinic in the Deleuzian sense of how different elements (whether they are human, animal, molecular, etc.) come together, connect, and produce something new. It opposes hierarchical, arborescent models in favour of a rhizomatic one, where connections are non-linear, multiple, and always open to transformations. The 'machinic' counters static identities, rigid classifications, and binaries. It's about multiplicities, becoming, and transformation.

, but why focus on notation? [important element in the assemblage, extra dimensional plane, where interpretation grows, a meeting point of different planes, membrane?, counter raw audio generation and conventional notation fixities, but maintain/propel/develop further the interpretation-space (which forms in the interaction between scores and performers/readers/engagers), as important dimension of music making.]

The importance of notated or inscribed artifacts as cultural objects can be underscored by a multitude of factors, which can be examined from both historical and future-oriented perspectives.

Historically, notated or inscribed artifacts hold a unique position as they serve as tangible representations of human intellect, emotion, and cultural expression. They provide critical insight into the socio-cultural dynamics, philosophical understandings, and technological advancements of various periods.

In the realm of music, notation has played a critical role in the transmission, interpretation, and evolution of musical ideas across time and space. A sheet of music provides a snapshot of the composer's creative vision, preserving it for posterity, and importantly allowing it to be interpreted and reinterpreted by generations of musicians. It is a dynamic object which engages, stimulates, and challenges performers and composers.

Looking forward, as we transition further into a digital age, the role of notated or inscribed artifacts continues to be relevant, albeit in evolving ways. The transition to digital media has expanded the possibilities for the creation, distribution, and interaction with inscribed artifacts. E-books, digital art, and digital music scores are all forms of digital notation that carry forward the cultural function of their physical predecessors, while also introducing new potentials for accessibility, interactivity, and innovation.

Moreover, the intersection of physical and digital realms can offer unique opportunities. Augmented Reality (AR) and Virtual Reality (VR) technologies, for instance, enable immersive experiences that can meld physical and digital inscriptions in novel ways, enriching our engagement with these artifacts.

Notations are codings of potential expressions as they are future-orientated and function as tools for various relationships, as they always come betwixt agents (be it performer and instrument/audience, or composer and performer).

In the context of the Hypermusic Experiment 0.9, the system leverages both the historical significance and the future potentials of notated artifacts. It recognizes the cultural value of inscribed artifacts and combines this with digital technology to create an evolving, participatory musical landscape. Here, the generated notated pages serve as artifacts that encapsulate the musical expressions of the moment while remaining open to reinterpretation and evolution in response to changing cultural and societal influences. This digital-physical hybridity not only preserves the importance of notated artifacts but also propels it into the future, inviting us to imagine new ways of interacting with these culturally significant objects (be it human and/or post-human interaction).

Differential ontology, *Desiring-Machines*, Hypermusic, and other background

Start with pieces (D-M, G-M, P-O), moving into ontology (Deleuze and Morton, de Assis), hypermusic (referring to de Assis and Morton), argument for the current potential of moving beyond abstraction, the conceptual domain, into concrete, or conceptual domain into the domain of materiality through technology (explore philosophically Deleuze, domains, assemblages, fields, planes? Plateaus?). Aim to set the ground for the experiment, prototype, or use this as a base for the model, and argue for its functionings, or the reason for its functionings.

Connecting the Real (ongoing transcriptions? Expression?) (continuing the real, quote about construction? (Margaret Morrison)).

In some of my compositional endeavours in the past I have explored the application of differential ontology to music or as I like to call it: continuing the real into the music domain. I have done this in different ways in different pieces. Here I will outline these approaches through three pieces I define as

multi-pieces, draw out their connections to differential ontology and setting the functional base of, and the reasons for, the Hypermusic Experiment 0.9.

The exploration of implementing differential ontology into music was most notably developed in my piece *Desiring-Machine* (Einarsson, 2012), a piece originally written for 24 musicians and two conductors and makes various use of a concept by the same name developed by Deleuze and Guattari. This piece, as well as others which will be discussed here, presents a critique on the idea of wholeness, fixity, representation and identity, and aims to operate as a multiplicity, on local and global levels, and therethrough explore a differential ontology of the “work”. This constitutes, partly, what I mean by multi-pieces and resonates also as a critique on the conception of the musical work as a whole and a fixed object that developed in the 18th century through the empowerment of the score, but could doubtless be traced to earlier conceptions (Goehr, 1992)). But the main impetus here was the ontology put forth by Gilles Deleuze and Felix Guattari, which affects the compositional approach in different ways. It can be performed and assembled in various open-ended ways: each instrumental part and any combination of parts can be performed as a piece on its own (with or without conductor(s)), resulting in a postfix title: partial-object 0.xxxx. Thus, the piece is in fact a *multi-piece* in the sense that there is no single instance capable of representing it, as it consists of 24 solos, 276 duos, 2024 trios, 10626 quartets, 42504 quintets, 134596 sextets, ..., 2704156 duodecets, etc. I call this the global assemblage/multiplicity. Through this aspect the piece is never a whole piece, i.e. the piece does never present itself as a single fixed object, we only ever can perceive it partially. Each performance is merely an open window onto that ever incomplete ‘whole-less’ activity which is the only identity of *Desiring-Machines*. [this is the theory, the conceptual dimension, abstraction...it is of course not being performed indefinitely, but that conceptual dimension becomes concrete in Hypermusic].

“In desiring-machines everything functions at the same time, but amid hiatuses and ruptures, breakdowns and failures, stalling and short circuits, distances and fragmentations, within a sum that never succeeds in bringing its various parts together so as to form a whole.”¹ (Deleuze & Guattari, 1983)

As there is of course a single version for 24 instrument and one or two conductors I needed to establish a multiplicity on the local level as well. The *local* assemblage/multiplicity strives to create a dynamic and unpredictable interplay between the conductor, performers, and the material itself. There I employ and invent techniques that assure that each performance produces difference, most important of these techniques are the following: (1) decoupling (prescriptive notation), (2) difference-repetition (multiple pathways), and (3) nonlocalizable conducting-moment (Einarsson, 2015).

Through the technique of (1) decoupling, physical components of players are separated from each other. For instance, the left and right hands of string players are given their own distinct parts. This means that the movements of both hands – or even fingers, hands, and mouths, when applied to various instruments – don’t necessarily work in tandem for a specific end result. Instead, they can be seen as independently moving forces, gaining independent materials and working towards an unpredictable sonic outcome. This approach results in rhythmic and dynamic independence within each instrumental part.² Furthermore, decoupling is also employed between the performers and conductor(s), resulting in an independent part for the conductor(s). Moreover, the conductor’s part and the instrumental parts are designed to repeat, but they are of different lengths, and continuously

¹ D&G 2004, A-O, p.45

² Einarsson 2012

different lengths. This means that as they repeat, they constantly meet each other's movements differently, creating a dynamic interplay.

Example 1: xxxx

This is the main functioning of the (2) difference-repetition, which in turn secures that the conducting moment emerges as a nonlocalizable communication at all times (3). Thus these elements and the piece itself aims to converge with Deleuze & Guattari's outline of the desiring-machines:

Desiring-machines are the following: formative machines, whose very misfiring are functional, and whose functioning is indiscernible from their formation; chronogeneous machines engaged in their own assembly, operating by *nonlocalizable* intercommunications and dispersed localizations, bringing into play processes of temporalization, fragmented formations, and *detached parts*, with a surplus value of code, and where the whole is itself produced alongside the parts, as a part apart or, as [Samuel] Butler would say, "in another department" that fits the whole over the other parts; machines in the strict sense because they proceed by breaks and flows, associated waves and particles, associative flows and *partial objects*, inducing—always at a distance—transverse connections, thereby *producing selections*, detachments, and remainders, with a transference of individuality, in a generalized schizogenesis whose elements are the schizzes-flow.³

By emphasizing difference, in a structural sense, and the return of the different, the piece challenges traditional notions of musical identity. The conductor and performers, in their dynamic interplay, become embodiments of pure difference, constantly evolving in relation to each other.

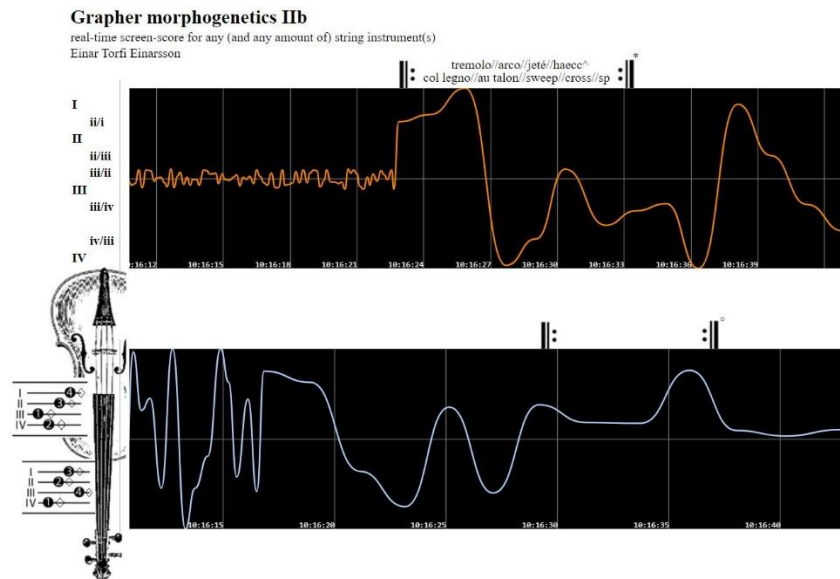
But the score itself is a fixed object (**what value does it bring?**), a physical object/artifact, a conceptual virtuality until performed that nevertheless is only a part of something bigger. And here we must connect this piece to the concept of Hypermusic as developed by de Assis (de Assis, 2022) as it combines, assembles and superimposes multiple materials of various natures, musical and non-musical. Hypermusic as conceived by de Assis is a multidimensional musical practice that intersects sonic events with a virtual constellation of texts, images, ideas, and cultural references, transcending traditional boundaries to create richer, more complex musical experiences (de Assis, 2022). The whole is always a part of another assemblage.

G-m:

Another approach is explored in the piece *Grapher morphogenetics IIb* (Einarsson, 2022), where a step into the digital realm provided a different perspective on the "whole-less" activity of the ~~work~~ (now under erasure). Written for a browser environment (screen score) and solo to any amount of string instrument and conceived as a multipiece, both as (1) having multiple versions graphically, i.e. every time they are opened in a browser new graphics are produced, and as (2) how they are performed/interpreted (various durations, techniques discretion, etc.). Here, the differential ontology is reflected, differently, in the ongoing aspect which is captured by the animated streaming of lines that are constructed in real-time using different frames of randomisation (see snapshot in Ex. 2). These moving lines (flows) are never ending and thus escape any structural beginning and end. Furthermore, the lines are placed within a parametric notational space indicating movement in designated areas on the instrument(s), again the technique of decoupling is employed, i.e. the left and right hand are here

³ D&G 2004, A-O, p.315 (emphasis mine)

engaged as independent, unforeseen, interplay of forces/movements. Various additional instrumental techniques are outlined but are implemented on performer's discretion.

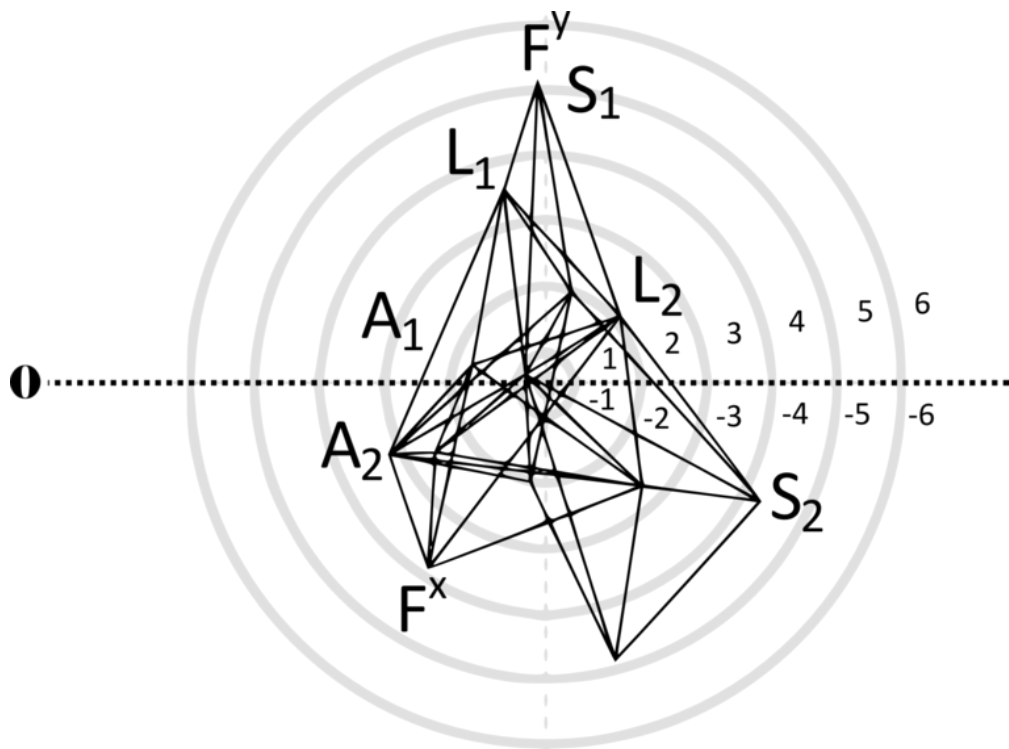


Example 2: a snapshot from the *Grapher morphogenetics IIb* score, (a moment that might never return).

U-f:

The third piece I want to outline is *Underdetermined figures*⁴ where a specific field notation is developed and network of multiple paths employed that brings various forces into interaction. The piece is a multipiece (multiplicity composition) which is designed for any combination and type of instruments. It is based on prescriptive notation of physical parameters. These notations are not specific to any single instrument or group and have the aim to combine ambiguity and specificity in notation. The notation should maintain instrumental ambiguity while being specific in its instructions. It worked with the concept of proto-objects (Schwab, 2015), which are shapes or figures that depend on context and are not yet identifiable. Transcribing this concept into a musical context it becomes a "proto-score", which is a score that requires a specific context to become an actual score and music. The proto-score remains in a state of virtuality, entangled in multiple pathways, awaiting specific contexts to actualize into music (obviously an element of all scores but here it is amplified). It does not prescribe a sonic identity but instead opens up a field of possibilities, much like Deleuze and Guattari's concept of the virtual (Deleuze & Guattari, 1987). This virtuality, filled with potential connections and inclusions, resonates with the Deleuzian-Guattarian idea that identity is not fixed but is a continuous process of becoming through differences. Just as Deleuze & Guattari argue that entities are constituted by a myriad of relations and differences, the piece is never singular but is always open to multiple interpretations and performances. Each performance, with its unique context and interpretation, becomes a new becoming, a new difference.

⁴ Einarsson 2015/2018, >>research catalogue: <https://www.researchcatalogue.net/view/186304/221229>



Example 3: a figure from *Underdetermined figures*.

The multipiece revolves around 100 such figures as seen in Ex. 3, that are read according to certain guidelines, but the duration, order, instrumentation, and presentation format of the piece are all open-ended, giving performers a lot of discretion. The figures are placed in a field or parametric space. This space has different circular areas representing numbers (Ex. 3) and when a figure is placed in this space, it can be read in multiple ways to indicate changes in values, which are then assigned specific physical parameters that operate as instructions for performers. For example, the parameters for strings instruments include force or pressure of action (indicated by F in Ex. 3), location on the instrument (L), number of active fingers (S), and spread of fingers or bow division (S), and each parameter has multiple starting points and multiple paths, and a specific spectrum (Einarsson, 2015). The field notation is divided into two halves by a zero line, which indicates a change in nature of the parameters, e.g., force becomes inwardly directed when read below the zero line.

When actualized or read by a performer, we see thus an interplay of forces, and the interaction of these forces can result in complex outcomes and interpretations, moreover, the parameters can be seen as forces that might clash or cancel each other out, making the piece open to unpredictability and experimentation by

...summoning forces. [...] making the invisible forces visible in themselves, drawing up figures with a geometrical appearance but that are no more than forces – the forces of gravity, heaviness, rotations, the vortex, explosion, expansion, germination and time (Deleuze and Guattari, 1994, p.182)

Planes, aesthetico-epistemic and Hypermusic

What these (multi-)pieces have in common is an interplay of three main planes (tri-planes): conceptual plane (knowledge), performative plane (the concrete sensory production, aesthetic), and technical plane (means and methods). These multipieces could therefore be seen as complex arrangements of aesthetico-epistemic components (De Assis, 2022, p.53), thus emphasising the intricate interplay between aesthetic properties and knowledge components within musical works. What is envisaged with the Hypermusic Experiment is a shift, where the conceptual plane shift into the performative/concrete plane, or, put differently, the *actualization* of the virtual elements present in these works. The differential ontology explored through these pieces is only an approximation to these conceptual worlds as the ‘bridge’ (the technical plane) is, in a sense, incapable and representational (which only makes an incomplete image). Performance instances of these scores only actualises them briefly but with new technology being able to *perform* them as code nonstop, these conceptual worlds would no longer be only conceptual, they become concrete, as these planes become more porous and variously flowing into each other..., of course a new conceptual plane opens up whenever the performative plane reaches into the previous conceptual plane. In that sense, these multipieces, these scores are scores awaiting to become codes performed by computers, triggering new set of tri-planes.

They obviously draw on previous musical works such as J. Cage’s indeterminism, B. Ferneyhough’s *New Complexity*, prescriptive notational practice of A. Cassidy, graphic notation’s of [...]

Global-local assemblage, ongoing, aesthetico-epistemic?

Subsume elements.

Outline of a Prototype: Hypermusic Experiment 0.9

The pieces discussed so far can be viewed as (proto)models for (important functional components of) the Hypermusic experiment 0.9 system. *Grapher Morphogenetics* provides/prepares the dynamic *window* onto that ever incomplete, ongoing, production, that ‘whole-less’ activity, while the *Desiring-Machines* provides the schizzes-flows, multiple paths, and the necessity of structural difference techniques (decoupling, spectrum from prescriptive notation to descriptive notation), as well as the value of a fixed object as partial-scores (artifacts). *Underdetermined figures* provides the interplay of forces and an intermediary space or ‘thinking’ space for the system (where similar fields could be constructed and employed with randomized dots and lines drawn between them to create infinite version of multidimensional parametric movements). Thus the outputs (of the system) will be in heterogeneous forms and formats, i.e. various live/real-time formats as well as various fixed formats of artifacts (partial-scores, the pages (indicating a fragment from something larger, namely process)). The generated partial-scores will emphasize the aesthetico-epistemic qualities of their making by allowing the tri-planes to flow into each other, where graphics (multifunction of inscription/material/technique/instruction and metaphoric/interpretability), text (the language of concepts and poetry), and performance come into contact with each other, and where performance is conceived as manifold, human and machinic, performer (human / post-human) and/or composer (yielding possibly other partial-scores). What follows is an outline of this system, its architecture and functional components.

5

“And when it operates on them, when it turns back upon them (se rabat sur elles), it brings about transverse communications, transfinite summarizations, polyvocal and transcursive inscriptions on its own surface, on which the functional breaks of partial objects are continually intersected by breaks in the signifying chains, and by breaks effected by a subject that uses them as reference points in order to locate itself.” (D&G, 1983, p.47)⁶

⁵ *The design (input/output, processes, spectrums, graphical problems, interaction, authorship, plug in AI, Blockchain, DAO, smart contracts...)*

Rationale for formats of artifacts, between human and post-human, should challenge current practice (a research-based notation machine). Rationale for prescriptive notation (why (forces, collisions, open for accidents, movements instead of fixities of frequency (pitch)) and how (mapping the instrumental dimensions))

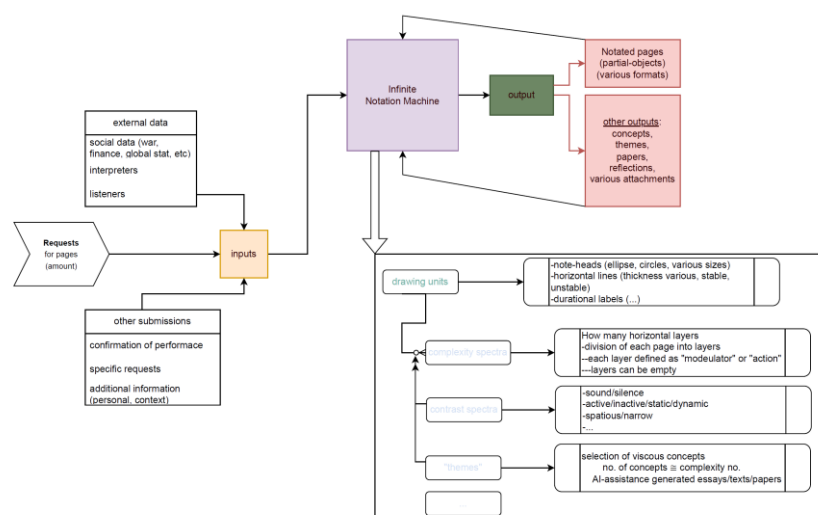
⁶ D&G A-O, p.47

Hypermusic Experiment 0.9 serves as a venture into the realm of musical notation, meticulously constructed at the confluence of differential ontology and computational design. Its core components are the input parameters, the infinite notation-machine (with all its sub-machines), the subsequent partial outputs, as well as the various feedback loops (see diagram, Ex.X). This system is not merely a passive recorder, or reorder, of musical thought but must be considered as an active participant in the very act of musical creation.

The system strives to be a hybrid of physical/digital and conceptual/performative dimensions, the outputs, both digital and physical, are the breaks in the ongoing digital flow, points of discontinuity that lead to new connections, flows, and formations (Deleuze, 1983). The physical objects, i.e. the partial-scores, will thus have invisible threads linking them to the ongoing digital/machinic performance of the system and each physical performance can be fed back into the system, transformed, in various forms and formats to further influence the system's production.

The notation-machine approaches notation as an open-ended graphical problem rather than a staff notation which conventionally employs representational symbols for precise durational values and pitch. It will however employ noteheads and curves, of various sizes, shapes and colours but here we emphasise molecular forces instead of molar (even though the system will be equipped to fluctuate between and/or superimpose such qualities on its surfaces), and give certain level of autonomy to 'cells' (and as with biological cells they might not express all their genes all the time).

System Architecture



Example 4: diagram of the basic components of the Hypermusic Experiment 0.9 system.

The inception of the musical notation process starts with user-defined inputs. These parameters serve as initial conditions, setting the stage for the infinite notation-machine's subsequent operations. Here, basic elements like the amount of pages, amount of instruments, type of instruments, morphology type, complexity types and levels, and other spectra can be adjusted. However, these are only variables informing the notation-machine which is a multidimensional production, rendering, always to a certain degree, unforeseen results. Furthermore, not all parameters can be adjusted and the available ones can also be randomly determined. Other inputs are foreseen to be implemented, such as post-performance submissions ranging from facts (dates and names, etc.) to reflections as well as other type of inputs that are not user-defined such as various external data flow that the system can 'listen' to through various APIs.

At the heart of the system lies the infinite notation-machine. It seamlessly integrates processes, drawing units, spectra, and solves various graphical problems. This machine continuously operates, generating endless musical possibilities that interacts with the given input parameters. How the interaction of the spectra works and the general operation of the notation-machine is delineated below.

Post-processing within the notation-machine, the outputs manifest in the form of (1) partial-scores (PDF pages of various dimensions) and (2) dynamic and evolving graphic notations inspired by the *Grapher morphogenetics IIb* through real-time 'windows', variously defined, ready to be interpreted and experimented with, by human or post-human entities.

Spectral Interactions in the Notation-Machine

"...Deleuze maintains a dimension of order that operates randomly through discontinuous junction that is comprised of divisions, and also determined sections. In Deleuze, the nature of order is, then, semi-random. Furthermore, the connected elements do not signify and are not homogeneous. In other words, they are nonsignifying and heterogeneous. What is found assembled in an ordered section are mobile stocks of information that fit into a system of points and drawings, a nondiscursive, transcurative kind of writing, according to Deleuze and Guattari, which forms a pastiche with Simondonian translation in order to locate a process straight out of the real" (Sauvagnargues, 2013, p.129).

In this quote, Sauvagnargues captures many important aspects of the operation of the notation-machine [...]. The idea of spectral interaction within the notation-machine mirrors, in many respects, the physical world's interference patterns, where waves, be it light or sound, superimpose to create new patterns, sometimes amplifying and at other times cancelling each other out. What follows is how the spectra is defined and envisaged to interact and function by taking the "middle road between order and disorder" (Sauvagnargues, 2013, p.129).

Within the notation-machine are various spectra that can be categorized thus:

Morphology: this amounts to form, structure and its dynamics, informing both the design and content, globally and locally. Within this category operate the spectra of complexity (complex vs. simple); contrast (seamless vs. contrasting); change (gradual vs. eruptive); fixity (indeterminate vs. determinate); geometry (linear vs. nonlinear); and information (descriptive vs. prescriptive).⁷

Design and drawing: this category is divided into spatial units and drawing cells, both informed by various morphology spectra.

Themes: themes (list of concepts, how they might influence, e.g., textual material/layer, performance notes and/or affecting the parameters of the spectra).

It is important to notice that the morphological spectra can influence each other by being superimposed, overwritten, or cancelled out. Three main mechanisms of spectral interference are employed:

- Layering and opacity: Just as in graphic design or digital art, each spectrum is visualized as a layer. The intensity, or amplitude, of its influence is related to its opacity. So, one spectrum can be "faded" in the presence of a stronger, more opaque one, representing the overwriting mechanism.
- Vector influence: Using vector mathematics, each spectrum could be represented as a vector in a multidimensional space. The resultant when all spectra are combined would give the final output, allowing for superpositions and cancellations.
- Thresholds and switches: certain thresholds where if spectra overlap beyond a certain point, they cancel each other out or trigger a new, unexpected outcome.⁸

The design and drawing's spatial unit: As the notation-machine operates with a two dimensional canvas or paper formats (width × length) the initial step is to determine these dimensions. This is the first step, it is randomly determined and sets the frame for other factors. Second step is informed by morphology: geometry spectrum and divides this canvas into subframes (or spaces) and is furthermore informed by the following inputs and spectra:

- number of instruments (which can be fixed or randomized as per request),
- complexity (determining the numbers of layers per instrument (as spatial division of the canvas-area for that instrument or superimposed layers within a given subframe, called sub-layer(s) with various degree of opacity)),
- number of pages (informed by morphology: contrast spectrum in regards to how similar the pages are as per request).

⁷ (fixed end results (such as pitch) or actions/movements); (open graphics vs. conventional symbols). – how to tune/orchestrate these parameters? (all possibilities will be embraced, even those with cancellation effect). Some are of formal/global nature, others of local material.

⁸ **Spectra:** conventional notation vs. unconventional notation (what is that?), indeterminate vs. determinate, descriptive vs. prescriptive ???, complex vs. simple, seamless vs. contrasting, gradual vs. eruptive...themes (how they might influence, e.g., textual material/layer, performance notes or part of the score) – how to tune/orchestrate these parameters? (all possibilities will be embraced, even those that with cancellation effect).

All of these can be randomized and the resulting partial-score approached by any instrumental force (solo to x-number).

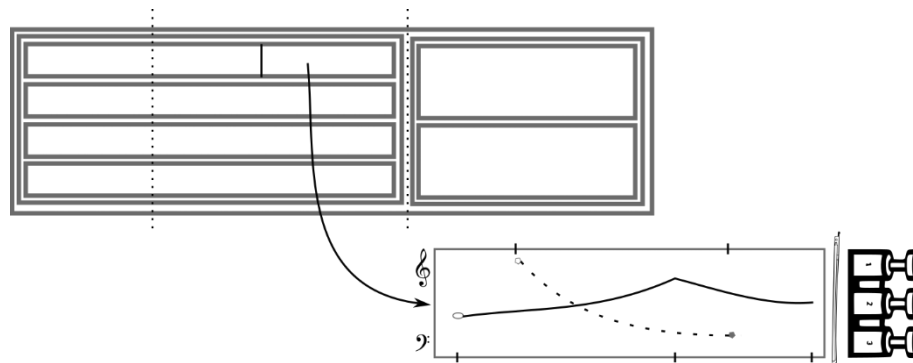
The drawing cells are further divided into (1) rhythmic activity degree (horizontal divisions), and (2) linear/contour activity degree (vertical variation) within given subframe. These are further influenced by morphology spectra on a local level.

These drawing cells are constantly running but are not always employed directly or inscribed onto the pages. They are thus smaller machines within the overall notation-machine, dynamic entities, defined by what I call meta-random function. For example, the linear/contour-machine generates constant values or variables (defined as percentage of a given frame), but does that through various, autonomous, behavioural patterns, e.g., through meta-random loops:

[::random distribution (various types, e.g., Uniform, Gaussian, and Exponential), within random interval, for random duration::]

This is similar to a biological cell expression that is not always being read, and can change its expression when other behaviour or 'genes' are activated, which happens here through the influence of spectra settings. This is part of the ongoing 'performance' of the system propelled by the differential ontology and also resonating with Bolognini's Sealed Computers series (Bolognini, 2012), as these 'cells' exist not as fixed entities but as endless possibilities, forever changing and never fully realized. However, this cell's expression can be read by and connected to the rhythm-cell which also runs continuously but when connected they distribute the values horizontally and vertically within a given frame, drawing noteheads, curves and/or various other symbols. Based on the complexity level, these can have many layers superimposed within frames that are defined either as descriptive (using clef spaces) or prescriptive (using physical spaces), or indeed both superimposed. The various spectra influences their range and behaviour, in terms of linearity, activity, transformation, variety, etc.

Examples of extremes: when considering this unit alone we can predict certain outcomes of various extremes, such as, very small canvas with high complexity and high activity? Here the system might have to adjust the size of the graphics (line width, etc.) to make sure they fit onto the given frame/space, but these outcomes are of high interest as they afford a specific challenge to performers/composers which in turn need to apply interpretation and/or experimentation in their approach (D'Errico, 2018).



Example 5: demo of a division of a canvas (upper image) and various definition using clef-spaces of a subframe (lower image).

Interplay of Spectra

Morphology Spectrum: Acts as the base layer. Morphological changes (like the distinction between gradual vs. eruptive) can act as 'landscapes' on which other spectra operate. For instance, an eruptive morphology might break up determinate notations. This informs thus the whole spatial dimensions (all the pages within one request).

Determinate vs. Indeterminate: This could function as an overlay. Where there's a strong determinate signal, it may dominate the resultant image, while an indeterminate one might blur or smudge the underlayers.

Descriptive vs. Prescriptive: Another overlay spectrum. Prescriptive notations might have certain anchor points that resist change or overwriting, given their prescriptive nature. In contrast, descriptive ones remain more fluid.

Themes: Act as filters. Based on the chosen theme, the canvas is tinted or shaded, affecting all underlying spectra. For instance, a "melancholic" theme might darken the canvas, making certain light notations less visible.

4.1.3. Spatial Units & Writing Units

Spatial Mechanism:

- Initial frame determination sets the physical constraints.
- Subdivision using spectra is dynamic. For instance, if there's a high degree of complexity, you might get numerous smaller, overlapping 'cells' or spaces.
- Linear vs. Non-linear affects the geometry of these divisions.

Writing/Drawing Mechanism:

- Rhythmic Activity: Represented by patterns or waves on the canvas. A high activity degree might introduce denser patterns or tighter wave frequencies.
- Linear Activity: Controls the orientation of these patterns. A high linear activity might make patterns more vertically oriented, while a low one makes them horizontal.
- Contour Contours: Introduce another writing unit that indicates pitch variations using curves, heights, or color gradients.
- Dynamic Shapes: Shapes (like circles, squares) can denote volume or intensity, with size and color indicating variations.
- Texture Symbols: Introduce symbols or patterns that hint at the texture of sound, like staccato dots or legato waves.

This proposal provides a structure that integrates the diverse spectra into a coherent notation-machine. The crucial aspect is to fine-tune the interactions, ensuring that the outcomes, even when unpredictable, are musically meaningful. Experimentation, iterative adjustments, and feedback from performers would be pivotal in refining the system.

Design Rationale

Input Parameters and Interaction: User interactions shape the input parameters. By allowing both humans and post-humans to influence these inputs, the system challenges and redefines traditional boundaries, offering a novel avenue that caters to contemporary and future musical sensibilities.

****Formats and The Human-Post-Human Interface**:** The formats used in Hypermusic Experiment 0.9 are not arbitrary. They are meticulously chosen to foster a symbiotic relationship between human and post-human. This is a research-based notation-machine designed to challenge prevailing practices, urging users to reconsider and reimagine music's boundaries.

****Prescriptive Notation's Justification**:** The decision to adopt prescriptive notation is rooted in its inherent dynamism. Unlike traditional musical notations, prescriptive notation doesn't merely depict frequencies and durations. It illustrates the movement of forces, the collisions, and is open to accidents. This format celebrates movement over static frequencies. The 'how' of this notation revolves around unique spaces, focusing on mapping instrumental dimensions rather than adhering to fixed pitches and note-values.

3.3. Functionality

Upon receiving the user-defined input parameters, the notation-machine adjusts its operation. Drawing from its diverse spectrums, the machine crafts notation, balancing between contrasting elements, complexity levels, and overarching themes. As it operates, the machine also addresses various graphical challenges, ensuring the output is both visually coherent and musically evocative.

3.4. Implications

Hypermusic Experiment 0.9 doesn't just add to the lineage of musical notation systems; it redefines it. By challenging static notions of pitch and frequency and introducing dynamism, movement, and the unexpected, it offers a fresh perspective on musical creation and interpretation. In bridging the human and post-human realms, this system presents a brave new world of musical possibilities, beckoning both traditional musicians and avant-garde experimentalists to explore its depths.

What is expected from a performer getting involved or interacting with the Hypermusic Experiment? Interpretation and Experimentation? System that is whole-less, boundless, ever-evolving, fluid,

nonlinear, dynamic, and released without supervision and authorship, autonomous, and non-hierarchical. Producing, often, cryptic, demanding, multidimensional inscriptions/graphics?

Implementing Hypermusic Experiment 0.9 as a DAO: Empowering Performers through Decentralization

Distributed Autonomous Organizations (DAOs) have not only redefined digital ownership and decentralized governance but have also paved the way for collective participation and empowerment. When Hypermusic Experiment 0.9 aligns with a DAO framework, it promises an intricate interplay of differential ontology, musical creation, and performer empowerment.

Synergizing with Differential Ontology and Performer Empowerment

The essence of a DAO, with its fluidity and absence of a central authority, parallels the principles of differential ontology which emphasizes dynamism, becoming, and difference. When Hypermusic Experiment 0.9 operates within this decentralized context, it promotes a collective and dynamic creativity, echoing the infinite prospects of the infinite notation-machine.

Building upon the ethos of indeterminate music and collaborative works, the DAO framework can foster a paradigm where every performer or entity doesn't just engage but becomes an integral co-creator. This evolution finds its roots in musical developments like indeterminate music, where performers have substantial autonomy, enabling them to shape and co-create pieces.

In the DAO-driven Hypermusic system, every performer is a shaping participant and a co-author (partaking "owner"), investing not just their creativity but also influencing the system's trajectory through the further development of the submission system. This democratization of ownership and creation aligns seamlessly with the advancements in music that prioritize performer autonomy, co-authorship and co-creation, but importantly, it propels it beyond the current situation.

The Mechanism of Smart Contracts: Dynamic Evolution of the System

Smart contracts offer a dynamic layer of engagement. Imagine a performer releasing new functionalities or modifying existing ones by merely submitting a documented performance (or annotated partial-score which elements the system can learn to integrate). These contracts can act as catalysts, with each performance potentially redefining the system's landscape.

Furthermore, the system's adaptability extends beyond human interaction. Through advanced algorithms, it can "listen" to societal data, such as social trends or environmental metrics, and integrate this information into its processes. This continuous data intake ensures that the musical outputs remain relevant and resonant with contemporary contexts.

File Systems Reimagined: The Promise of IPFS and Future Considerations

To build the Hypermusic system, a comprehensive design is essential. It requires a robust mechanism to generate partial-scores and manage the influx of external data. Integrating with the InterPlanetary File System (IPFS) ensures decentralized storage, enabling sustainable and accessible partial-scores. In the ever-evolving DAO space driven by differential ontology, each partial-score undergoes a transformative journey, constantly reshaped by its interactions within the decentralized network. This is the ideal environment for a multipiece.

The convergence of Hypermusic Experiment 0.9 with a DAO framework brings forth several exciting possibilities. Yet, specific considerations remain:

- **Governance & Ownership Model:** Creating an equitable model that balances individual creative freedoms with collective decisions.
- **Incentivization & Tokenomics:** Introducing mechanisms to reward performers and contributors.
- **Scalability and Adaptability:** Ensuring the system evolves with changing societal contexts and technological advancements.
- **Interoperability & Integration:** Seamlessly integrating with diverse digital infrastructures and data sources.

Melding Hypermusic Experiment 0.9 with a DAO framework signifies a future where technology, philosophy, and art converge. It champions a vision where performers are not just interpreters but active co-creators, influencing and being influenced in a dynamic, decentralized musical cosmos.

Writing and overwriting, and superpositions and cancellations (random forces?), interactions of the spectra, what escapes coding (the schizzes-flows = what performers/composers might bring/add but also these overwritings)?

Unlike traditional scores that are sequentially ordered, each output, the pages (partial-scores) are released for performance in a random manner. Each performance request, therefore, weaves a unique musical narrative, a serendipitous journey across time, blending past, present, and future into a rich undulation of temporal experiences. Furthermore, the pages will have various sizes or dimensions, exhibiting extreme differences in formats (heights and widths).

For instance, a request for seven pages could yield numbers such as 547, 87, 67884, 3, 7546547, 4999, 703566, each with a different dimension. Each number represents a fragment or a 'time-zone' within the Hypermusic universe. As performers and audiences encounter these fragments, they begin to grasp the vastness of this musical Hyperobject (cf. T. Morton). Additional fragments, generated close to these regions, continually broaden the perspective and deepen the understanding of the musical landscape.

The participatory nature of the Hypermusic experiment further sets it apart. Anyone can make a request for pages, creating an open, democratic musical space. However, performers who engage with the generated pages can submit a "confirmation of performance," alongside details of their interpretation, approach, research, etc. This information forms an integral part of the Hypermusic Machine, shaping the generation of subsequent pages and influencing the evolution of the musical narrative as well as archiving its ongoing becoming.

The Hypermusic Machine is also designed to embrace external data. Information from societal trends, previous performances, and even specific details such as venue location and performer names can influence the generation of new material, creating a feedback loop that adds depth and context to the evolving music.

The Hypermusic System then introduces the concept of spectra in its core compositional and notational machine. However, when composing systems (multi-pieces) instead of composing pieces of music we must consider the transformative consequences of aesthetics, structure, and material. In Hypermusic, these elements are represented as spectra: spaces of complexity, density, contrast, and medium-stability, each with its layered parametric subtypes. These adjustable parameters provide a fertile ground for endless possibilities of musical expression and connectivity between internal and external influences. Furthermore, the Hypermusic experiment also proposes exploring complex and negative numbers, spreading the partial-objects within the complex plane, implying musical dimensions yet to be uncovered. This leads us to an intriguing question: How can we construct this system to be receptive to societal and cultural changes?

To build the Hypermusic system, a comprehensive design is essential. It requires a robust mechanism to generate pages (1), manage the influx of external data (2), and design, refine and adjust the spectra (3). Tools for this might include programming languages for backend development (such as Python or JavaScript), database management systems for storing the generated pages and external data (such as MySQL or MongoDB), and eventually blockchain technology.

In the subsequent versions the Blockchain technology offers particular benefits to the Hypermusic system. Its decentralized nature aligns perfectly with the participatory approach of Hypermusic, allowing for a fair and transparent distribution of authorship for the generated fragments. Moreover, Decentralized Autonomous Organizations (DAOs) can manage the ownership and propagation of the fragments, further supporting the democratic ethos of Hypermusic.

Additionally, a DAO would provide an ideal platform for managing the Hypermusic system, reflecting the fluid, ever-evolving ontology that it aims to exhibit. The DAO's decentralized decision-making process mirrors the non-hierarchical, participatory approach of Hypermusic, embodying a similar ontological stance.

Transcursive, precursive, discursive...

The system *reflects/continues* the real, and the partial-scores reflect/continue the system

We might add to this that unforeseen results are embraced by the system.

- AI has to be addressed, implementation sketch, furthermore, this essay could be seen as an advanced prompt for building the system (using multi-agent framework like autoGPT-like systems). [essays as prompts, mapping and modelling as prompts].
- Has to be developed with performers, their interaction taken into account (almost like user-studies), implement how their submissions are both archival in nature (gathering various particles, artifacts, forming constellations, growing the network of the ~~work~~, etc.) and informing the system or affecting its behaviour. Participation involves also audience, critics, who might want to submit reflection, opinions, etc.). The partial-scores, might not only be used by performers, they could be used as models for composers. This would be another way of engaging with them as there are multiple ways to perform/composer them, multiple ways to assemble them. A computer or any post-human entity could also perform them (even in simple ways by rendering the partial-scores as sound based on the location and types of graphics within the image, **so-called graphic-score sonification**).
- Authorship. The system, once implemented as DAO, is owned by anyone who engages with it

Further explorations, AI and Conclusion

Blockchain implementation (technological issues (e.g. storage (IPFS))), what is gained by that?

Post-human performance (formats, readability, accessibility), VR? Art robots (ref?)?

Formats, VR and 3D partial-scores, infinite canvas (2d/3d)?

Needlessly to say, the highspeed present development of AI could be implemented in various ways within the system, both in further design and functionality, and in graphical and textual material employed by the notation-machine itself, where the spectra are framed as prompts. It is probably even soon possible to build the whole system using multi-agent framework and use this essay as a advanced prompt.

In conclusion, the Hypermusic Experiment 0.9 presents a radical reimagining of music generation. By intertwining notation, randomness, interactivity, physical and digital dimensions, and societal context, it pushes the boundaries of our understanding of works of music. It embodies a concept of music that is not bound by linear time, but rather exists simultaneously in multiple temporalities. This novel approach aligns with the ontological perspectives espoused by Gilles Deleuze and Timothy Morton's concept of Hyperobjects, as it presents music as a fluid, dynamic entity that is continuously evolving and interacting with the world we live in. In doing so, Hypermusic paves the way for a new kind of musical experience, one that is rich, participatory, and deeply connected to the reality of our lived experiences.

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Digiscore

Margaret Morrison

⁹ Load pdfs get summaries (D-M, paulos article hypermusic, deleuze, Morton, Brassier (abstract vs. concrete, Buchanan (assemblage))