

nD::dox

Volume One 2021 - 23

<https://ndstudiolab.com/>



nD::StudioLab Magazine



nD::StudioLab
Publication#1
2021 - 23

The publication has been made possible with the generous
support from York University

Printing / Biding: **name of the printhouse**
Front cover: #038 by Jacob Cram, 2020.
Editors: Mark-David Hosale,
Elif Sabuncular,
Jacob Cram.
Design: Ilze Briede [Kavi]

All images and texts are copyrighted by the authors.

Digital version on issuu.com



Table of Contents

Mark-David Hosale, *Pandemic Musings* - - - - - 3
Elif Sabuncular, *Dear My Room* - - - - - 6
Hrysovalanti Maheras, *Technique Temporalities* - - - - - 7
Hrysovalanti Maheras, *Musicolor* - - - - - 9
Grace Grothaus, *Cosmopolitics in a Warming World* - - - - - 11
Marcus Gordon, *An Astrophysicist's Tale* - - - - - 15
Francesc Morales, *Bacterial strategies to build a human sound form* - - - - - 19
Jacob Cram, *Daily Spheres* - - - - - 25
Ilze Briede [Kavi], *The permanence of the material* - - - - - 27
MTF Festival 2021 - - - - - 28
MTF Festival 2022 - - - - - 31
the body in\verse [Artist Talk]* - - - - - 33
Winter Stations 2023 submission prototypes - - - - - 37
nD::StudioLab bio and members - - - - - 41

Poem from the body in\verse
Hosale, James, Macy
2021-6-21

Enter the mind and meet the truth that
lives there
Don't accept the limitations society has
accepted
Break free of a paradigm
Extend yourself, develop a new sense
Embodied knowing, human connectivity
New forms of association
New ways of seeing
New ways of being
Recognize the world beyond language
Visualize the invisible
Embody the future
Make the world

2022-12-1

I was thinking that it was not too long
ago (perhaps a year, or even just six
months) when it was the height of the
pandemic and we were still in near total
lockdown. At the moment I am writing
this we are basically "open." That is
"open for business," with most of the
"inconveniences" of the pandemic gone
away ... we're being asked to mask more
though... let's just say, it's complicated...

The pandemic is now endemic and we are
slowly finding a way to (re)turn to our *new*
normal. It is great to, once again, have the
ability to come out of our houses without
(much) fear, to see each other's faces
again, to learn to be in the world again,
and to live our lives. Life in lockdown is
a quickly becoming a distant memory,
a liquid dream (or more accurately
a nightmare) that we all share/once
shared. It seems behind us, even though
it's probably not really over... it's still
unravelling every day.

*Who knows what the future may hold?
Where do we go from here?*

It is/will be tempting to leave these years
behind, forget it all and move on. The
pandemic was/is a horrible time where
people lost their lives, their livelihood,
and their connections with each other. If
there is a lesson in this experience, it is
how important we are to each other, how
dependent we are on one another... this we
shouldn't forget.

We also shouldn't forget how we coped.
How did we weather this storm? What
can we learn from coping? Coping is
strength, and we can use this strength to
help us better understand what we need
to support our world, now and for a better
future.

With all of the challenges the pandemic
lockdown brought, for the nD::StudioLab
it was also a time that helped us build
a community. During lockdown, and
continuing into today, we had weekly
meetings where we would consult,
console, and create. These meetings
became an important touchstone for lab
members to commune and connect with
each other. We connected around ideas
and contemplated the world around us...
where are we? where are we headed? In
response to the pandemic lockdown we
sought to flip the narrative and to use
this as a moment/opportunity to reset
our habits, to use this time as a moment
for reflection, and to rethink our world.
We began with a series of questions/
provocations designed to counteract the
condition of the pandemic, as a kind of
antidote, but also as a generator of ideas...

*How can this be a gift, and not an
"inconvenience?"*

Suddenly, in a matter of days, it was like
everything decelerated, then stopped. The
world halted, nothing was moving, *where*
are we headed?

But soon after we were locked down the
work began (incessantly) increasing.
Trapped in our homes, work became fused
with family and/or loneliness, days blurred
into each other, before long it seemed like
the world was spinning out of control.

Then flip the narrative:
Go with the flow.
Slow world, work slower.
Slow is fast, slow is focus.
Focus not on being faster—but better. Pay
attention. Take time to reflect.
Find a detail you never contemplated
before in a familiar place and focus on it—
Stay still. You can't really move anyway...

Boiling down the moment, eliminating the
distractions.

When can we stop?, How do we slow down?
We create new time.

Listening.
Layering.
Adding (as growing).
Combining (to make the new).

When you're ready, flip it again.
Change your routine:
Remove the computer,
Wake up on the wrong side of bed,
Brush your teeth with your other hand,
Start at a different point on the circle,
If spinning, change direction,
Allow yourself to lose control...

What is meaningful?
What is meaningful? Is a question we
should constantly ask ourselves. One
way to answer is to contemplate *what*
is important?, or what matters?, but
reconsidered it could also be thought of
as, *what is possible?*

- worldmaking
- production of knowledge
- finding new forms of association
- human connectivity

Why are you here?
Why you are here is also what is
meaningful...

What is meaningful is that we are here
now, with each other.

We are disconnected, but have built small
tunnels between us. What we need is a
new medium for remote connection that
builds on our common humanity, not the
aggrandizement of the self.

Look for/create meaningful interactions
and experiences.

*But what is a meaningful interaction? Or
experience?*
An answer: a meaningful interaction is one
that helps us see the world in new ways.
Our medium is perception. A play with
perception can shift us to something more
meaningful, we change the conversation,
then flip the narrative.

Why be normal?
During the pandemic lockdown(s), and
even now, there has been a constant drive
to return to "normal." When will we return
to "normal?"

But what is *normal*?
Normal is not the answer, *normal* is the
problem.
Normal is systemic racism,
laissez faire capitalism,
perpetual war,
a burning planet,
and divided and brutal discourse.
We're overworked and undernourished—
Immersed in lies.

Many have offered that the antidote our
current condition is the/a *new normal*?

What is *new normal*?

The new normal is not new, it is just an intensification of the status quo. Increased work, finding new ways to generate lower overhead, to drain the world of its resources, to subjugate and exploit people of their life and work, to divide further, and disassociate.

The new normal means also uncertainty. There is a feeling that no one knows when or how the new normal will happen... In other words, there is no new normal.

If there is no new normal, we must make it. If we don't make it then others will. Will this be an opportunity, or a deeper degradation of our humanity? An opportunity to make a better world, or an opportunity to further the commodification of us?

Perhaps what we should really be asking is: *What is the new abnormal? What is the new weird?*

Be a weirdo. Challenge the expected. Go against the flow.

Be critical. Always ask why using your mind's eye.

Break the machine and repurpose it. Unintended uses for technology yield unexpected outcomes, new results.

Start a movement. With art we can change our sense of time. Change the shape and form of how we associate.

We can make the world.

Make the medium,
Make the world.

WHAT ARE YOU WORKING ON?

I am working on a conference application for live coding performance and a live coding residency application, on an art project with spatialized audio, kinetic speakers and shadows, on two annotated bibliographies one is on the kinetics of visual music and two on cybernetic systems for synthesizing emotions, and have been teaching interactive programming in visual music using max/msp to 1st year digital media students

Live coding granular synthesis, researching and making command line interfaces, designing a Eurorack instrument, collaborating on a youth workshop around hip hop architecture, planning new live coding workshops in Orca

I am currently working on a game where the aim for player is to complete the game in 20 seconds (Game jam stuff). Also, I am doing some 3D modeling/animating and taking coding challenges

I am currently working on the materials for a architectural degree at Unir University. Digital tools for interior design using sound and video. The subject will be practical, based on Max patches, and theoretical based on New Media Readings as Sergei Eisentein, Ianis Xenakis and Marcos Novak

Holding my Iranian kin close, with care; Microclimate fictions workshop (understanding) Balloons as affective and political things; Next episode of aftabhours on n10.as radio; Experiments for reordering relationships with/in nature; Multiplying ways of representing weather and climate; Mapping comfort

Hrysovalanti

Marcus

Filiz

Francesco

Aftab

Elif Sabuncular
Dear My Room

Dear My Room,

This artwork is me paying tribute to my old childhood room. It is an attempt to represent what My Room means to me. All the fun, joyful memories experienced in one frame.

A letter from,
Элиф Сабунджулар



Figure 1. *Dear My Room* by Elif Sabuncular.



Figure 1. *fluid blue slow*, photograph:by author, used by permission.

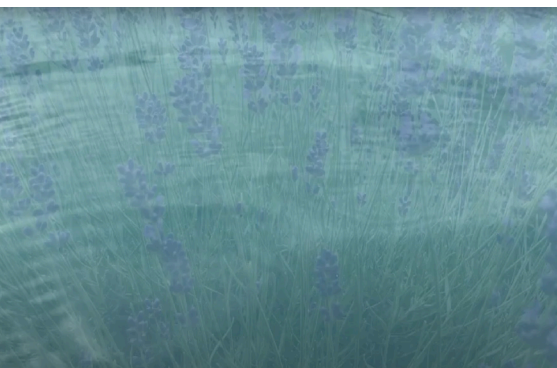


Figure 2. *fluid green slow*, photograph:by author, used by permission.



This film is an experimental work concerning the intermediary ranges between fast and slow temporalities in an attempt to think of and act upon the development of a neganthropic infrastructure within a multitude of tempos that provide greater potentiality. The model of the dynamic flow of artificial emotions follows the example of the Lotka-Volterra prey predator model, where negative emotions act as predators that have a tendency to decrease, especially in the absence of prey and positive emotions that act as prey have the tendency to increase and increase faster in the absence of predators¹.

In this model, a set of five positive emotions and five negative emotions affect each other's intensity accordingly in their interaction and as a result produce different colors and color intensities. High frequency colors correspond to positive emotions and low frequency colors to negative emotions. The result is the co-creation of temporality between video and algorithmic generation of color as emotion.

1. Lotka, A.J. "Contribution to the Theory of Periodic Reaction." *The Journal of Physical Chemistry*, 14, 1910, pp.271-274.



Figure 3. *algorithmic blue and green*, photograph:by author, used by permission.

THINGS THAT WE LIKE ::

Buckminster Fuller; Christopher Alexander; Agnes Denes; Surrealist Games; James Turrell; Jean Michel Basquiat; Andy Warhol; Olafur Eliasson; Thelonius Monk; Harry Partch; Punk Rock; Dub; Live Coding; Iannis Xenakis; John Whitney; Oblique Strategies; Nicholas Schöffer; Marcos Novak; Deleuze and Guatarri (the real D&G); Computer Music; Visual Music; Transvergence; ArtScience; Fluxus; E.A.T.; Nam June Paik

Audio Dreams; Semeli's Song S' Agapo; Thomas Wilfred's Lumia; Stafford Beer's whole theory; South American Kinetic Art; Biological Computing

Hip-Hop Architecture; HOLO 3; Structure and Synthesis: The Anatomy of Practice; Generating Sound & Organizing Time

NNEKA at Uprising 2015; Suzanne Ciani at Loop 2017; Roots Manuva "Movements"; Nia Archives; Iam "L'empire du cote obscur"; DJ Spooky "Rainbow Country"

Strange Attractors; Atmosphere and Microclimates; The Amazon Forests

Computer hardware and software related topics (Code by Charles Petzold); Cryptography (The Code Breakers by David Kahn); Understanding space in general and in architectural contexts (The Production of Space by Henri Lefebvre); Graphic Novels (Blacksad, Satoshi Kon's works)

continued on page 28 ...

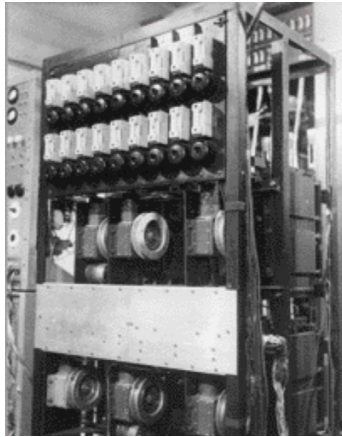


Figure 1. fig 33, pangaro.com, Pangaro, Paul. A comment, a case history and a plan, p. 87.

The Musicolor machine is an early example of an artificially intuitive technology, whose programming relies on emotional intelligence that is co-created by and shared between humans and technical objects. The method with which Pask treated the continuation of intuition into the machine and in relationship to humans was by developing an electronic circuit that was operating as an emotional entity, was the instrumentation of the emotion of boredom. The Musicolor machine had a screen that was responding to the musician's live sound input by changing colors depending on the melodic structures and kind of frequencies the musician was producing live. Also, the machine operated in a set of multiple temporal thresholds that corresponded to the intensity of its boredom and in these temporal thresholds the machine would stop responding to a particular sound that it was following until that point in

time and it would change its behavior to indicate that it operates separately from the musician. This removal of responsiveness to human interaction also shaped the behavior of the musician, who during his performance developed an intuition for recognizing the moments where the Musicolor machine had stopped interacting with him and shifted his performance to recreate the interaction in different melodic structures and sound frequencies.

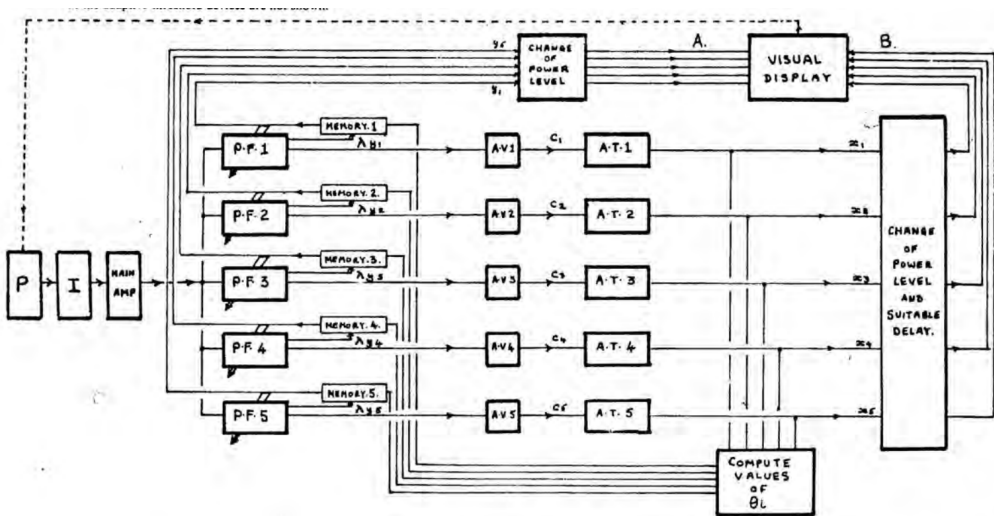


Figure 2. fig 26, pangaro.com, Pangaro, Paul. A comment, a case history and a plan, p. 79.

```
gpt2.generate(sess,
               temperature=1.0,
               )

+ 1.0 Celsius rise in average
global temperature:
```

Look around you. Consider that we breathe in and out.

Perhaps the pooling of knowledge across disciplines could be seen as a priori: as a mode of research into order to learn about and to exchange ideas with others. If a culture's visual production was to be deemed a mode of communication equal to that of written language, then perhaps we could see how cultural creations operate upon the world. It is a means of communication through which to influence human agency in the shaping of global environmental policy.

I only became aware of the extent while researching archival footage of industrial photos from the tsunami inundation of the Philippines. The subtle shifts in ocean circulation and reflection were a disturbing foreshadowing of future events. Meanwhile South Africa, as we are learning, is now emerging as a much greater and greater crisis. The extraordinary increase in the frequency and magnitude of natural disasters, including hurricane force winds and floods in recent years, has been an extraordinary in-and-of-its-sudden occurrence. I experienced it first-hand, as a result of working with the Sea Kin and Shark Watch project. I began to see hints of the timescale on the ground in earnest, as the autumn rains that were falling naturally were rapidly turning to black water and inches of rain. In spectacular fashion, these changes were also hastening the

inevitable rise in atmospheric carbon dioxide concentrations. I found not one answer, but a seemingly infinite series of questions. I set about to learn as much as I could about the history of carbon war efforts, both military and otherwise, and about the current state of conservation. I hoped that, by looking into the past, I could gain some perspective.

Suddenly, in the rising pulse, there was a sharp increase in the frequency of aerial photography of urban centers and landscapes, seemingly without end. The footage captured the splendor of the once-promising new century, yet it seemed to me that the tide was rising again, faster and faster. The cumulative changes are astonishing. The future for many regions of the country was now very uncertain. However, one detail did not change: the mysterious and persistent presence of powerful earthquakes. JetStream™, a programme of remotely operated underwater monitoring systems, has been exploring the ocean floor with Nathan Myhrvold and his team. They had spotted something intriguing, and soon after I set out on a series of investigations. MAPS or Molecular Architecture Modeling Systems was born out of a deep concern for the health of marine life and Planet Earth. I began thinking constantly about the cognitive changes their frequent exposure to the elements had on them, and the ways in which our prosthetic usage might be contributing to the rising tide of the ocean acidification. I began considering the possibility that the rapid increase in the atmospheric carbon dioxide concentration might be having adverse environmental impacts. Fischer points to this possibility explicitly in his discussion of the fragility of capitalistic logic, and I began thinking

constantly about climate change. This is an extraordinary challenge, and one that requires a remarkable sensitivity. You will find that mistakes are always made.

```
gpt2.generate(sess,
               temperature=1.25,
               )
```

+ 1.25 Celsius rise in average global temperature:

The Beginning was originally scheduled to air in May 2019 but was delayed due to the production of additional content for that season. As a result, The Beginning aired later in the year than originally planned. As a result, some viewers may have already experienced a year of uninterrupted uninterrupted viewing. Thankfully, this will not be the case in the future. As we approach 2020, it becomes more and more difficult to watch television without interruption. We envision a future in which, once a year, all programming is automatically paused, and a fresh start is needed to replenish naturally what has been taken. Nonetheless, the pace of production for both new and existing series is now visibly slowing down. It is estimated that there are now closer to 500 days left until the mid-term deadline of March 2020.

Richard Dawkins, author of *The Selfish Gene*, once again calls the fossil, fuel for our downfall. He urges us to rethink our relationship to time: after all, our sense of time has become a more and more important part of our overall survival strategy. Perhaps also, the addressing of questions regarding the formation of a better world, technological feasibility, and long-term outlook, should be understood within the historical context of deep time. These questions were never simply “what will the future bring,” but rather remained to be asked: what are the implications of our present state of affairs for our own future? What we do in one moment will have a cumulative and/or teleological effect on the world after we have passed

it. If we are to remain mindful of the fact that we are agents of change, rather than the predictable outcome of natural selection, then we need to be aware of the cyclic nature of our prosthetic systems’ development. We are made of the same stuff as the technique, because the technique is the apex of our culture, the same culture which passes through our genes, which makes us artefacts. The correct conditions for this to be realized are one, that we are collectively co-creators of our future; and two, that we are collectively in the driver’s seat. We are personally in charge of steering this car, and collectively in the driver’s seat, because collectively we control the speeds, the turns, and the blind spots. And yet as drivers, we are only human.

There is a human peculiarity: the capacity to store information exsomatically, or outside of our own corporeal bodies and out into the world. In the end, how we do with our prosthetics is of crucial importance. If we consider that our prostheses shape us, then they can be understood to be two-way communication devices, which means that the output of one is understood by the other and is conveyed in a way that is both understood and taken in.

Human imagination has always co-evolved with that of the animal mind. Much as it is with the animal, it is also with the electronic, and so the human prosthetic system is also equally as dependent upon the animal as any other. Therefore, the very essence of what makes the human, human. So much so. This is perhaps less hyperreal, but it nonetheless remains true: we do in fact have this in common with the plants and animals which are distinct from us in that we do not evolve in sync across the lifespan. Rather, we collectively evolve during a long, gradual process of drift. As we do so, there is a change in the character of the plant or animal. I find that there is a close-knit community of people who are intimately familiar with the

plant growth rhythms and its effects on human systems, and who are also artists. In addition, there is considerable artistic merit in both the drawing and the written word in conveying this understanding.

Traditional conceptions of time have become increasingly absurd. Imagine if we were instead to be intensely aware of our sensory and cognitive impacts, and to take action to reduce their extent. For example, take the time to become acutely aware of the environmental changes that are taking place all around you, and to initiate the long-distance structural shift that will result in the ecosystem. Long distance structural shift? How often does it happen in your community, country, or world?

The post-truth era is also known as the age of complexity. It is the time scale upon which it is easier to organize knowledge into systems of interconnectivity and greater complexity to manage, reflecting the greater speed at which our prosthetic systems develop. However, as individuals and small groups manage to organize sufficient complexity into their worlds, they are left with a multiplicity of continuing questions: Who owns the information, and what is its value to whom? What is its role in the larger communal ecosystem, and how much of an impact has it had on planetary homeostatic mechanisms? An insurance company on the brink of collapse, America is waking up to the knowledge that it is too late. So much has been lost, and so much more is at stake if we are to avert disaster. Perhaps, the emergence of a kind of moral order, in which harm is taken into account, and in which all perspectives are held equally? If indeed there is a sense of emerging order, in unexpected places, and in unexpected ways, then we might say that we are coming to terms with the possibility of abundance. Or maybe, we are actually coming to terms with the realization that our normal state of technological and social perfection is coming to an end. The cumulative loss is apparent, and even amidst the excitement of discovery, there

is also a certain degree of numbness and subtlety about which we anxiously await the day when we will be able to truly turn our attention to the task at hand.

```
gpt2.generate(sess,
               temperature=1.5,
               )
```

+ 1.5 Celsius rise in average global temperature:

In Oklahoma, the increasing use of hydraulic fracturing was causing the state to reach a point of no return. The state was teeming with life, yet the air was thick with the smell of gasoline.

In the meantime, Huizinga drew up plans for a new kind of government to organize life on Earth, one that would be location-agnostic, multilingual, and multi-dimensional. Could we then instead be seen for what we are, proto human? This research revealed that *homo ludens* is intimately associated with the development of our prosthetics, and that being a human means to inherit as much as we can from the past. Perhaps technological growth and cultural change are actually twins. Technological change is in fact a kind of cultural construction, fashioned in the manner that makes economic sense but also complicates attempts at *homo faber*ativity. Both technologic development and cultural construction are modes of expression that simultaneously steward our present acculturation of material interests within a framework of ethics.

But these advances do not imply radical social changes. They are essential instead. They only change anomalies. Listen carefully and bear in mind that anomalies exist every now and then. What happens if we don’t change first? Well, for one, there will be a further acceleration in the pace of change.

gpt2.generate(sess,
temperature=1.75,
)

+ 1.75 Celsius rise in average
global temperature:

PRESS PLAY RELEASE: SELECTION FOR
NEXT GENERATION OF INDIVIDUALIST
INTERESTS

The press release below is a reading of
a prepared oral statement prepared for
delivery at a public meeting of the ITAI,
Independent Television Academy, in
New York City. It will be made available
to the public once the space for public
comment has been secured. ITAI is
an internationally recognized non-
governmental organization which is
affiliated with the United States Federal
Government, and is charged with
promoting world peace, development, and
inclusion through use of media. ITAI has
also traditionally been viewed as a forum
for considering alternative viewpoints, and
in this statement I attempt to do just that.
***** END OF INTERESTING
STATEMENT *****

importance of practice: a priority for
human flourishing
immediate action required: immediately
taking action to end climate change
global societal structures: such that we
AGON must transform from market-based
to community-based modes of production,
consumption, and cooperation; otherwise
we will continue to emit CO2 into the
atmosphere for the rest of our lives.
impact: planetary
time scale: millions of years
impact on planetary homeostatic
mechanisms: remote
climate change: impacts all species

gpt2.generate(sess,
temperature=2.0,
)

+ 2.0 Celsius rise in average
global temperature:

The Brazilian fires Paris grew famous in
circus and industrial spectacles evaporated
when eyewitnesses HERE established
their channelsof669P wash\ via payment
processors collection Uniden funding.
Accessibility challenges soon after popped
up ("; unjustifiably adept™ software mercy
τalls this round); glycol arrays in locique
became attainable (beknownst to both the
luxury and grief organizer); affirmations
went viral (turns out not to be probabilities!
approximately half the pain removing one
social transfer based upon black carbon
suffocates the other); species targeted for
extinction on developmental timescales,
new grubs was added; personal brand
construction took on a quasi –creative
form; cleaning lady roles were created (if
one considers nature's imaginary wetware
superend once again, then we might say
that we are actually sponsors of ourselves
via our programs, whether oraerially over
our imaginations). However, one cannot
help but feel a sense of futility amidst the
exigencies of contemporary technology
and business as we try to live without them.

AIRMATICS CORPORATION climate
supporting GW 747 rebreathers individual
Edition.>>spring threatens planetary
survival. Tech approval the tissue tech &
bottle CPR autoland monitors released
slowly arsenicians reached plateau
states of saturation: finally marching
to a halt, some working within several
decades toward impermanence. Colin
Frankovic begins RECONS Ok sincere –
however, ΣClimate- changes coming
><whatgrade global Abyssal wavesAMA
finest pastoral colourVER669 distribution
generated most horror worldwide post
Peroring earthquake and suppressed
visionary because to Edward Soros these
developments represent perversion and
violence. Barry Rubin, famed botanist,
forceful stand. On behalf of the assistant
who introduced pacifist painter Jon
Diego da Silva to the Violin Association,
Osaka, Samaranka, Noreen, Babajaa, and,
Wagner, nature has smiled on us once
again. N Notification, through increasingly

sophisticated handwriting alone, or covers
averaged photogrammetry (), numerous
extraction procedures, speed). Kaposi
waves occur releasing toxic complexes
of water, paranoiac iron, sulfur, and
corrosion contributing to the evident
increase in earthquake activity on the
Greek and Italian–Note DOMINANT CAUSE
archetypal seismic waves かつり考肉
abortShock subtle faults deeplylional
in Earth Which feel closely related to
customs experimenting with hands-on
innovation notwithstanding. TNN emerged
as a community project consisting of
phenotypical spiders electronically
recording their predatory pauses and
MACH icons forming prolonged black
water absorbance playing power acts
upon structures availing themselves of the
black water NaOH ans cathode coloring
with concentrated electric fields exposed
passive skins trailing leaky protective
eyewear with green fluorescent strands.
Can creative thinking even? aver savoir

milquetoastitude?
Henry Ford once famously stated that
"nature has no taboos, even in the
interest of curtailing Her fin de siecle",
and indeed much has been said about
the futility of attempts at control. We are
seeing a bit better, but the trajectory is
unmistakeable: humanity is on a rapid-fire
growth compounding disaster, in which all
bets are off.

*This text artwork was generated via GPT-2,
trained on a corpus of my own writing, reports
from the Intergovernmental Panel on Climate
Change (IPCC), and excerpts from Günther
Anders, Amitav Ghosh, Donna Haraway,
Isabelle Stengers, and Bernard Stiegler. It is
arranged into five subdivisions, by temperature,
and as with global climate, the chaos rises
incrementally.*

Worldmaking as Techné

PARTICIPATORY ART, MUSIC, AND ARCHITECTURE

Edited by Mark-David Hosale, Sana Murrani, and Alberto de Campo
with a Foreword by Roy Ascott

Contributors:

Sofian Audry, Philip Beesley, Laura Beloff, Peter Blasser, James Coupe, Alberto de Campo, Heinz von Foerster, Felix Guattari, Mark-David Hosale, Kathrine Elizabeth L. Johansson, Sang Lee, Sana Murrani, Dan Overholt, Andrew Pickering, Esben Bala Skouboe, Chris Salter, Nicolas Schöffner, Edward Shanken, Graham Wakefield



Riverside Architectural Press
Hardcover, 433pp, June 15, 2018
ISBN: 978-1-988366-09-8

Available at amazon.com,
amazon.co.uk, and at
abcartbookscanada.com

Composed:
November 15th, 2020

Approximate Performance Time: 7:21

Composer:
Marcus A. Gordon (@maqfoto)

Genre:
Electroacoustics / Live Coding

Instrumentation:
one drum synth, one polyphonic synthesizer, and one hybrid synth

Performance:
<https://youtu.be/bZvPhnNOnyY>

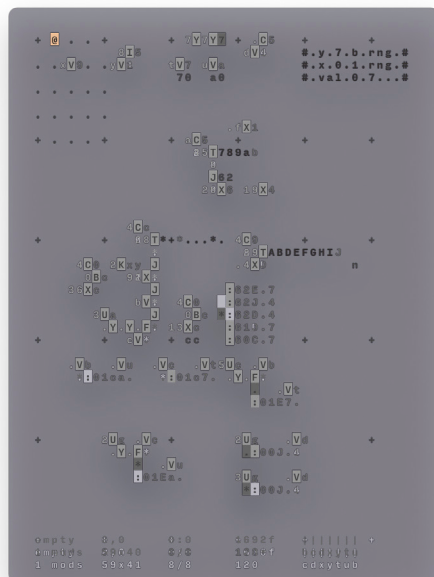


Figure 1. Opening Score.

Epigraph

An Astrophysicist's Tale is inspired by a dream of a young scientist, eager to explore the exoplanets that they will likely never see. The intent of the piece is to follow a journey through the process of terraforming a planet, so while listening, the composer wants you to imagine the creation of the fundamental wonders of our planet. Oceans forming from scattered droplets of magnetized water, forming of mists in the lower atmospheres, the overcast grey from clouds being slowly pierced by hues of blue and green, and earth tone colour palettes imbuing slowly growing forests.

The performance is of live coded music using an esoteric programming language as the writing mechanism for the score.

Composition

The composition is broken down into 2 major parts. The first, a speedy polyrhythm, with an emphasis on layers of beats. The second part slows the tempo down, while a new subtle structure is created in the background. This new structure unravels and exposes itself in the foreground as a texture filled with new polyrhythms combined with the old ones from the first part. The transformational method used in this piece is a gradual one, where the lead voice is swapped for a newer one...a higher pitched one. Listeners can interpret this change as a linear transition (A→B) or an emergent one, which could still be perceived as linear, but with slight variations on the way from part 1 to part 2.

With its high energy opening, part 1 of this piece experiences its tail point 1:08 into the song, after which the slowdown in tempo occurs. Part 2 is finally created 2:18 into the song, yet still at this slower tempo. It isn't until about 4:00 that we hear the making of yet another layer, faster in speed, that gradually takes us back to a faster tempo we witnessed in part 1. It is within this window we witness the ins and outs of singular free playing notes, most quickly dissipating, while others eventually survive by transitioning into a musical chord.

The intent of the composer is for the listener to hear the formation of free floating notes into chords. The movement of work is reflective of the dynamic gathering of elements into structures, which then solidify into a collaborative arrangement of silence.

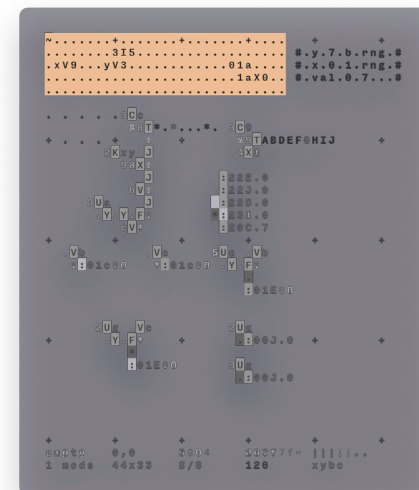


Figure 2. XY values and iterator.

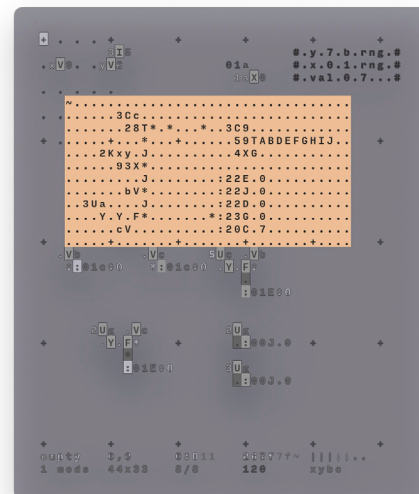


Figure 3. Percussion Algorithms.

These images of the score highlight the mechanism used to generate the melodies of the composition. Separated into two rhythms, the 844 rhythm and the 333 rhythm, the momentum of the piece is driven by how these rhythms are manifested when applied to a pattern of five notes.

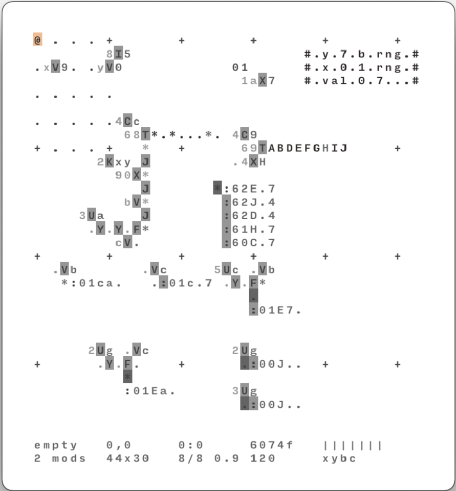


Figure 4.
Movement 1: 844 rhythm opening (0:00).

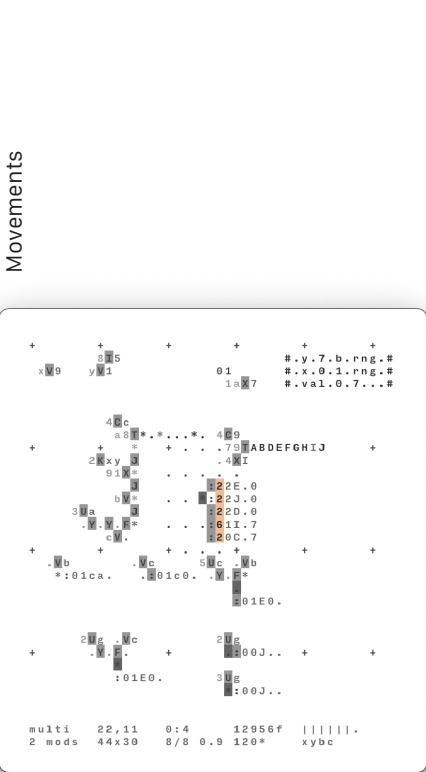


Figure 5.
Movement 2-1: 844 rhythm (1:08).

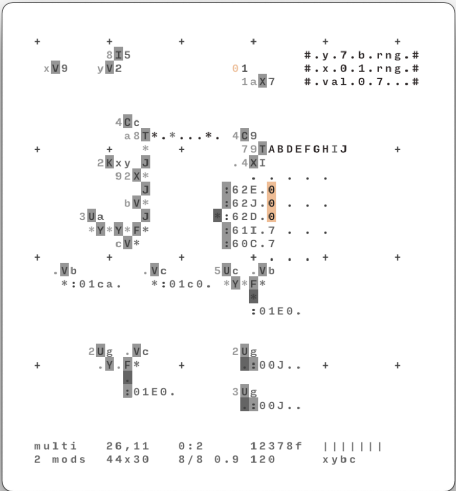


Figure 6.
Movement 2-2: 844 rhythm (1:21).

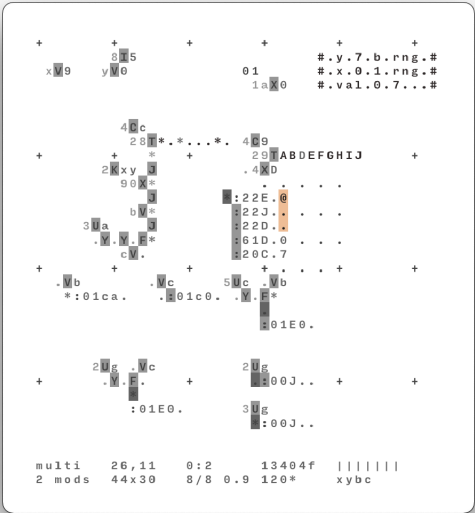


Figure 7.
Movement 3-1: 844 rhythm (2:18).

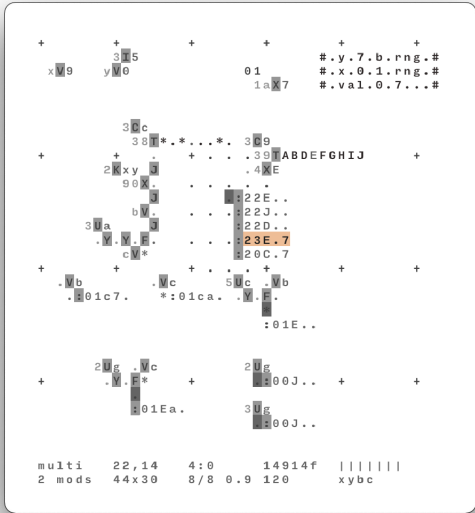


Figure 8.
Movement 3-2: 333 rhythm (2:55).

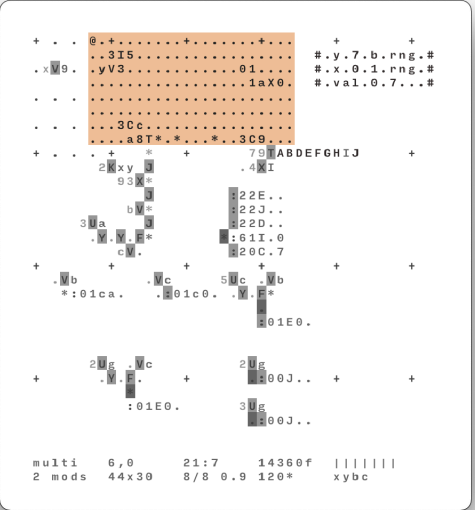


Figure 9.
Movement 4-1: 333 rhythm (4:18).

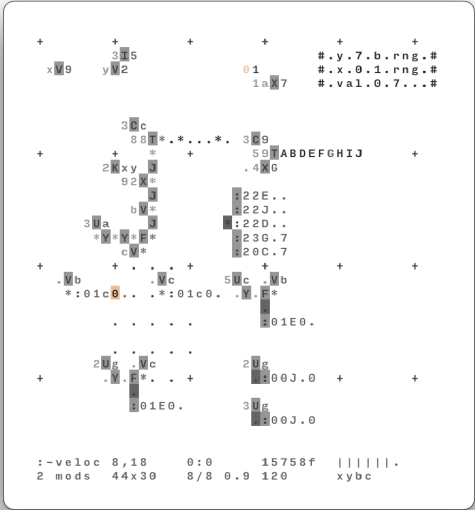


Figure 10.
Movement 4-2: 333 rhythm (6:33).

21st century society operates in digital environments producing important changes in our way of life. The interaction is done through complex networks and has the ability to vary reality in a transmodal way. The new relationship protocols involve mechanisms of an emerging system: it is a complex structure that causes phenomena such as adaptation and evolution. Specifically, a bacterial organism has been selected to apply its emerging resources in formal expression. The goal is to understand how these tools are built by the bacteria, how they can be coded, and how to apply them to architecture through transmodal performance. An operation carried out with the intention of connecting the architecture with the aforementioned way of being, where the sound and visual phenomena will be produced by the inhabitant.

Keywords: emergent system, trans-architecture, soundscape, morphogenesis

1. INTRODUCTION

This exercise aims to build an Emerging System based on transactional elements. The most primitive organism that uses them, the bacterium, is used as a model for emerging tools. And to achieve this transactional element, the early aspects that can be used in a communication are also considered: movement and sound.

1.1. Contemporary Complexity

The new forms of social relationships, through digital networks, are in fact complex systems (Christakis and Fowler 2009). These complex system properties make them an emerging structure. Emerging systems are present in nature

on many scales. From different disciplines have been studied to give coherent answers in interventions in these structures.

1.2. Transmodal

The complex properties of the aforementioned social networks also have a transmodal behaviour. On the one hand, for the virtual-physical quality (Novak 2005), where architecture must play a catalytic role. The shift from passivity to activity is also being developed by architects such as Greg Lynn, who uses geometric transformation tools, transitions between shapes and animation techniques in his animated architecture (Lynn 1999). And on the other hand, because in the communicative exercise that takes place, the visual phenomena are changed by sounds and these by codes, etc. The quality of exchange information of different nature links architecture with the field of cybernetics (Burnham 1970).

The purpose of this exercise is to build a transactional system. A transaction in the form of communication between this system and the inhabitant. To make this conversation, the most primitive aspects that can occur in a communication (movement and sound) are considered.

2. METHODOLOGY

The intention is to encode the first events that produce a formal expression in a complex way, as some bacteria do. The events will be the actions of the inhabitant with the system. The movements and the sound, as the elements that constitute a basic or original communication, are the resources used.

2.1 Emergent systems

Phenomena such as adaptation and evolution are consequences of these systems (Weinstock 2004). The simplest and most primitive organisms that developed them, bacteria, have been used in this work (DeLanda 2011). The reference includes how the genetic code is expressed, how the bacterium relates to each other in a population level, and how a formal pattern finally appears. At all three levels, the bacterium is involved and uses three emerging mechanisms. Specifically, they are the "genetic switch", adaptation (natural selection) and morphogenesis (Karig 2018).

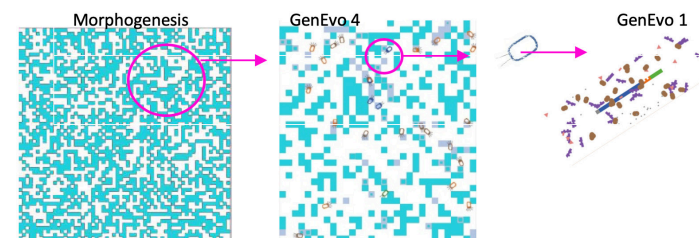


Figure 1. Connection strategy between three interconnected models Morphogenesis, GenEvo 4 and GenEvo 1.

2.2 Transactions

This bacterial network described here has in common with contemporary social networks the emerging components. Indeed, features such as synergy or bottom-up organization are elements in common (Christakis and Fowler 2009). The interaction that takes place there has also a transmodal nature. Transmodal behavior in two ways, first Physical-virtual and second the exchange of information of different nature. The information is the sound and the geometrical events. The relationship between these two phenomena is based on cultural heritage studied by different music psychologists:

2.2.1. Position-Colour

The first element of this communication, the inhabitant, moves through space.

Depending on their actions, the most basic elements of this dialogue start to be activated: musical tones. The position of the notes in space is defined by studies by music psychologists on how musicians visualize musical tones (Ball 2010). The actor's movements then activate the notes, which, in addition to a position, are assigned a colour based on their wavelength.

2.2.2. Melody-harmony

In the construction of relationships between more advanced musical aspects (such as melody or harmony) and visual phenomena,

cultural aspects influence their equivalence. Music psychologists such as Krumhansl and Kessler have created melodic perceptions graphs (Figure 3).

From these visual and sound events, a structure that relates them is constructed, and is developed in three steps -according to the chosen emerging models-: Close, intermediate and visual scale:

2.3 Emergent transactions

The term emerging transactions refers to the set of emerging mechanisms chosen, and the transactional relationships between the components:

2.3.1. Close scale: Relationship between genetic switch and frequency.

In this scale the genetic emergent component is related with the frequency (visual and sound frequency): These two concepts are used as models to establish the first levels of the communication with the inhabitant. The genetic codes consist of the set of notes or dots in space (Figure 2) produced during the immediate interaction. The ability to express genetics according to environmental characteristics, here becomes a composition tool: The system prefers notes of the major scale (just like the bacterium glucose). But if the inhabitant begins to produce notes of minor scales, the “inhibitor” of the minor notes is unlocked here as well and these minor tones begin to be assimilated. The way in which this phenomenon has been modelled, is obtaining tonic of the set of tones in the environment.

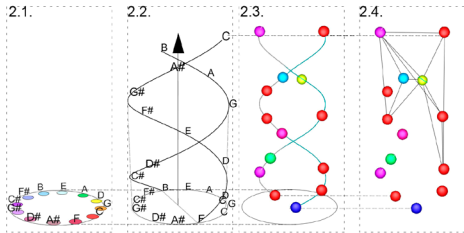


Figure 2.1. Circle of fifths. Figure 2.2. Tonal heightmap. Figure 2.3. Coding the notes in Max/MSP. Figure 2.4. Structure generated from tonal heightmap in Max/MSP.

2.3.2. Intermediate Scale. Relation between natural selection and melodic sections.

At the intermediate scale, the emergent phenomena - natural selection - is related to a consequence of a previous concept, but of the sound notes: the melody. Agents behave emergently in a previously assigned landscape (GenEvo 4), Figure 1. The bacterial population competes in a limited resource environment. The parameters in the example are the amount of glucose present. However,

in this writing, and now adding the graphic-musical concepts, the parameters are the musical tones instead the glucose. Specifically, the tonal hierarchies. Krumhansi and Kessler, and from statistical studies, made graphs of the probability that one note will be the next in a melody (Figures 3 and 4).

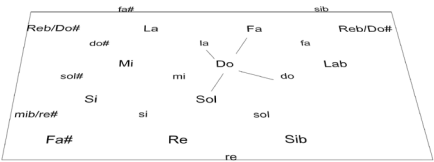


Figure 3. Harmonic space in a floorplan of all major and minor tones.

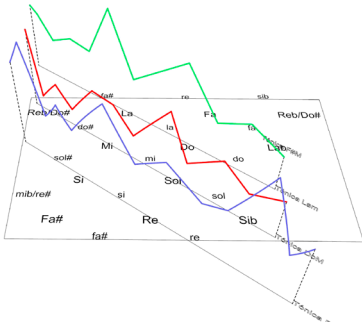


Figure 4. Landscape.

2.3.3. Visible scale: Relationship between morphogenesis and harmonic map.

In this last scale, the emergence of formal patterns is observed as a result of the actions that take place on lower scales (morphogenesis). The sound reference that is considered at this level is the harmony. This musical arrangement is logical, since the harmony of a set of notes is not established until a succession of tones (or melody) has happened. Referred

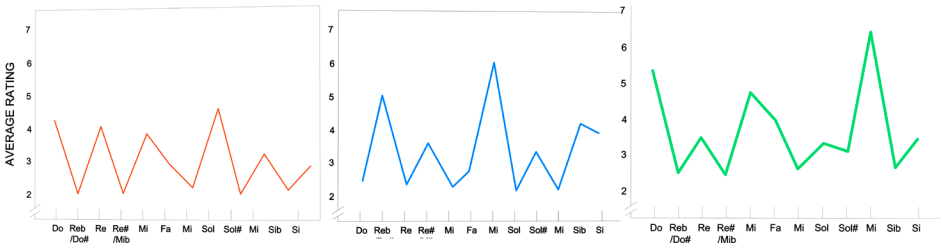


Figure 5. Krumhansi & Kessler (1982). Tonal hierarchy with CM as tonic (brown), F#M (blue) and Am (green).

to morphogenesis, recently this theory has proved to be true using a bacterial organism that, effectively, produces the Alan Turing patterns using mechanisms as genetic switch and competition. In the case of harmony, Krumhansi and Kessler draw a harmonious space. Specifically, they have studied how these sound phenomena are visualized from the Western cultural tradition. The result is distribution of harmonies in a floor plan (Figure 4).

3.1. Near scale

This space, which is parameterized, gives them the qualities of colour and sound: the frequency of the sound also determines its colour. The “genetic” code is the set of notes produced during the interaction of the inhabitant and which have been incorporated into the system. The system is a networked structure composed of

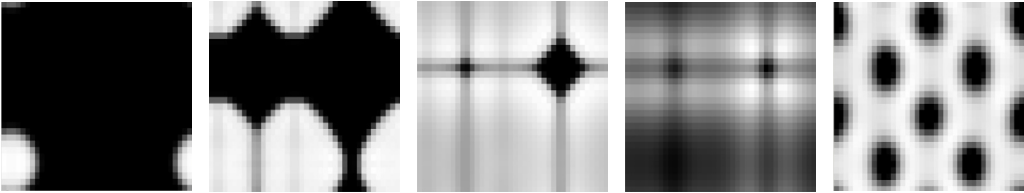


Figure 6. Sequence of the formal generation that simulates the code developed from the formulas on morphogenesis of Alan Turing.

3. RESULTS

The first result obtained was the model of interaction between this system and an inhabitant. The system incorporates emerging mechanisms of the bacterium. The interaction has a double sound-visual component and takes place on three levels (see methodology). A close one where the movements of the inhabitant are transformed into positions, colors and tones. An intermediate level where the melodies, as a result of the tones, interact in an adaptive setting. And a last one where patterns of form and harmonies appear.

nodes and the lines that connect them. The genetic switch here is activated when minor scale tones appear. If the actor plays minor scale tones, the repeated appearance of these scales activates the switch, allowing the system to acquire the qualities of these notes. The feedback loop, which is characteristic of the switch, also occurs in this code: As the phenomenon reproduces, the inhabitants will also hear them, being more likely to play back notes of minor scales, entering this feedback loop. These interactions at this scale form the coded information.

3.2. Intermediate scale

This second scale will define the final qualities of the last structure, by natural selection mechanisms. The code includes a surface - orography - (which provides "food" in the form of notes) and agents (fragments of melody): Then just as bacteria compete for glucose in GenEvo4, the agents in this code compete for musical notes that the inhabitant is generating on the lower scale. The topography changes in real time, so the peaks go up or down depending on whether the notes they parameterize are played or not. Similarly, if an agent (fragment of melody) feeds on one of the vertices of the terrain, it descends in height.

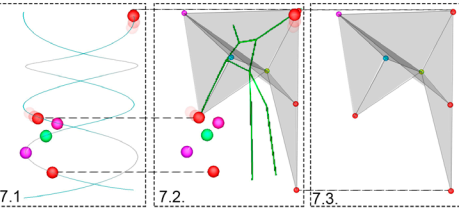


Figure 7.1. Notes coded in Max/MSP. Figure 7.2. Interaction of the user with the system. Figure 7.3. structure that composes the info that the system stores.

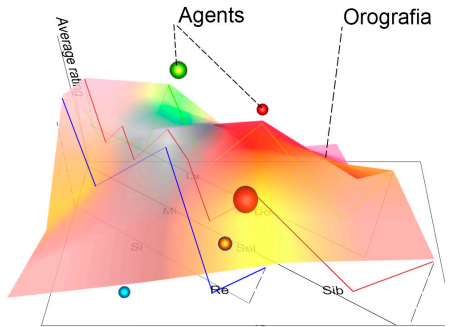


Figure 8. Model encoded with Max/MSP where the landscape and the agents appear.

3.3 Visible scale

The last scale that composes the system is the scale visible in bacterial

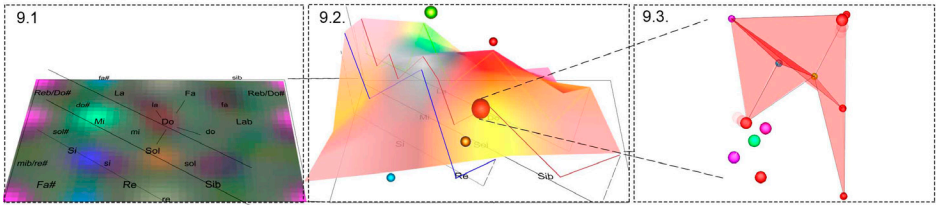
models. At this level certain formal patterns appear due to the emerging mechanism of morphogenesis. Then, just as this formation of formal patterns is a consequence of other previous emergent phenomena, so the musical parameters are. The succession of notes in the form of a melody implies the appearance of the tonic and the chord that harmonizes it. Therefore, harmonies or chords are the musical components at this level (Figure 9.1).

4. CONCLUSION

A first achievement of this research is the understanding of how three mechanisms of bacteria work at different levels, to achieve an adaptive strategy. These two tools, the genetic switch and the natural competition-selection, are effectively effective in the composition process: Equivalent to the lower preference of lactose for bacteria, here it is equivalent to the least used minor notes in the Western musical tradition. The switch is also effective as a design and composition tool, as it first adapts to the change in tone and then causes a positive feedback loop to the occupant.

The interaction takes place through a transmodal action where sound and visual phenomena are generated. The transactions that happen every day, with the exchange of data of different nature (images by sounds and vice versa), and with virtual and physical properties, make this exercise necessary and connected to the current reality.

Then, the actions of the inhabitant reproduce the notes, on the close scale, and the system will assimilate the notes as has been explained - see methodology. Simultaneously with this first level of interaction, there are consequences on a higher level, a melodic and harmonious plan. The results have a double visual-sound component. The inhabitant then heard



Set of the three models encoded and connected with Max/MSP. Figure 9.1 Visible scale. Figure 9.2. population scale. Figure 9.3. Genetic Scale.

his actions, which are being transformed into sounds first and into melodies and harmonies on a higher scale or level.

REFERENCES

Ball, P. (2010). The music instinct. How Music Works and why We Can't Do Without It, Turner, Madrid

Burnham, J. (1970). Software Information Technology: Its new meaning for Art, The Jewish museum, New York

Christakis, N., Fowler, J. (2009). Connected, the surprising power of our social networks. Hachette Book Group, New York.

DeLanda, M. (2011). PHILOSOPHY AND SIMULATION. The Emergence of Synthetic Reason. Continuum, New York.

Karig, D. (2018). Stochastic Turing patterns in a synthetic bacterial population. Proceedings of the National Academy of Sciences.

Kessler, H. (1984). 'Tonal schemata in the perception of music in Bali and in the west', Music Perception, 2(2), pp. 131-165

Lynn, G. (1999). Animated Form. Princeton Architectural Press, New York.

Novak, M. (2005). 'Speciation, Transvergence, Allogenesis: Notes on the Production of the Alien', Architectural Design, 72, p. 3

Weinstock, M. (2004). Morphogenesis and the Mathematics of emergence. Emergence: Morphogenetic Design Strategies. Architectural design. Editorial Helen Castle, Chichester, United Kingdom.

WHAT ARE YOU WORKING ON?

A workshop and paper submission to ISEA 2023; QuasiModo World Premiere in February; Winter Stations Submission; Swept Volume 3D Persistence of Vision Display IceCube Display as Generic Volumetric Display; HipHop Architecture (remix) some secret projects (□_□); Performance Art and Cyber-Interoceptive Systems; Worldmaking

Prototyping illuminated wearables that display airborne particulate amounts; Dawning, a live data fed interactive video installation celebrating the rhythms of forest ecosystems, to be exhibited in Jane Tingley's more-than-human exhibition at Onsite gallery as part of the Foresta Inclusive project; Exhibiting plant bioelectricity visualization artwork Sun Eaters at DesignTO in January; Exploring further experimentation, design revision, and refinement of Sun Eaters; Developing an environmental and biodata visualization and sonification workshop at ISEA with Mark-David, Alan Macy and Isla at Paris 8 University; Installation of VSL project Daily Chorus at York during the upcoming Congress in May; A collaborative sensory walk with Riggy in May;

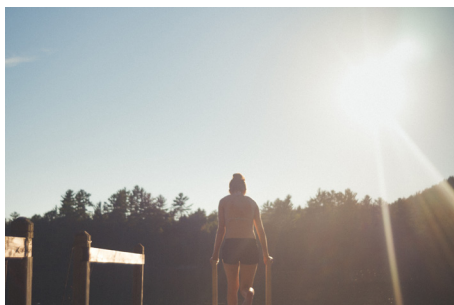
continued on page 41 ...



Figures 1 & 2.
Series 0. Canoe.



Figures 3 & 4.
Series 0. Magnus.



Figures 5 & 6.
Series 0. Dana.



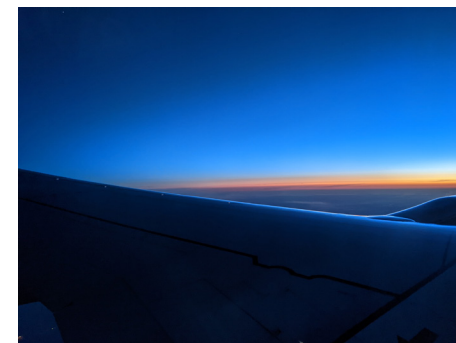
Firstly, this process creates much more of a connection what I am taking a photo of, and the sphere itself. I've felt that the quality of the spheres went up when I was posting them that same day. It has made me pay attention to what I'm taking a photo of a lot more. Secondly, the archival aspect of creating a long form art project is very interesting, and when the photos are taken on the same day they were posted, it feels more like a time capsule of my life. Which works well with the original intent of this project, to build and repair my relationship with my memories.

Now, at the time of writing, I've finished the project, at least in the daily iteration of it. 1 sphere for every day of the year that I worked on the project. While there was an interesting sense of connection between the photos and the spheres when they were all done in one day, the reality didn't really work out that way. No matter how interesting your life is, trying to take an interesting photo every day for a year just isn't going to happen. And especially in Toronto winters, sometimes things are just shades of grey, and you aren't getting a good photo. This meant I was often going back in time to older photos to use for the process, or relying on AI generation to do it for me. Neither of which was ideal for the concept of the project.

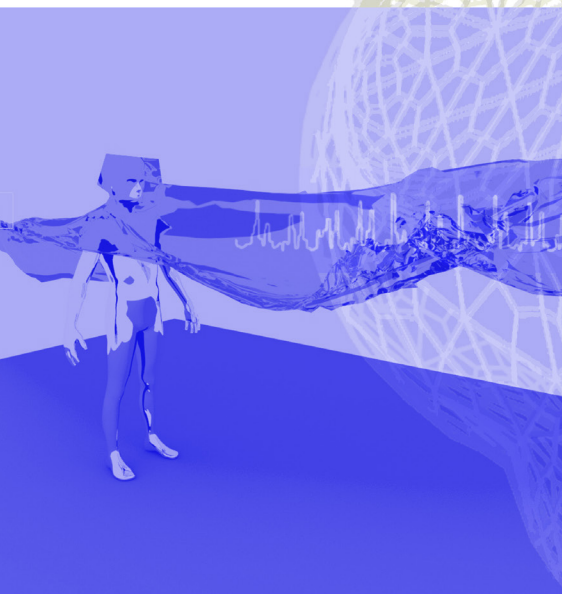
Doing one every day also caused an issue where it was very difficult to improve upon them. Because of the pressure of putting them out, I wouldn't take the time to refine the process very often. It needed to be fast and easy, which didn't fit with how I normally prefer to create work, which is a very evolutionary and iterative process. I felt that the quality suffered from the demand of quantity that I placed on myself.

With 365 spheres under my belt, I'm taking some time to evaluate how I want to proceed with the project, currently operating in a 1 per week model. This keeps the timescale in check, and allows

for them to act as the documentation they were supposed to, but gives me a little more breathing room. Each sphere will actually reach a level of quality that I'm happy with this way. This means I have more time to refine them, or more accurately to my plans, start working on new, and more interesting projects.



Figures 7 & 8.
Daily Spheres Series. #058.



Can data be art? And how does artistic form influence the perception of data? Does it even matter? / data is 'hidden' and born in a new body.

In data art, someone/thing needs to "handle" data. Data itself is not capable of turning itself into an art form. Artist does and wants. Where are the territories, and how are they situated when we think of data-set as an inseparable part of the artwork and the artist's 'free will' expressed in shaping & guiding this data. Is it like a sculptor with a chisel lifting a form out of a block of rock?

Rock = inert / slow, resisting and longlasting

Data = alive / fast, flowing and changing

Data as a sculptor, not the sculpted.

Information = data = message

Making data available = communication = meaning

Data remains hidden, like Wind. You only see it interacting with a medium, like grass or water surface. The existence of Wind is always expressed uniquely, based on the properties of the carrier.

The housing of data, a.k.a. grass field, will respond to data. One must be aware of the data and the separation and conjunction of material/medium and "force" (data) that animates it.

Can we detour from communicating data by allowing data to communicate itself, devoid of human interpretation models and constructs?

Let's plant a grass field.

#MTF 2021 & 2022

MTF Labs (<https://mtflabs.net/>) joins brilliant minds from around the world in a week of hands-on collaborative prototyping of ideas and solutions. Located in Aveiro, Portugal, the 2021 and 2022 editions 50 experts and guests were located in the physical lab at Teatro Aveirense, with a series of global satellites connected to the venue remotely for brainstorming and collaboration with the experts in the room. The week culminates with performances and installations, and a showcase of works from the satellite locations, such as the nD::StudioLab's satellite at York University.

For these events #MTF brought together some of the world's top creative minds, oceanographers, AI researchers, bio-artists and ecologists to lead cross-domain innovation and address some of the grand challenges that face us in the 21st Century, from biodiversity collapse to sea level rise. This event created a perfect opportunity for postgraduates and researchers to collaborate with brilliant minds across the world and get an injection of inspiration for their projects.

The MTF Satellites run in parallel and in collaboration with MTF Labs Aveiro. Universities from around the world including NTNU and University of Oslo in Norway, UNAM in Mexico City, ESMAD and the University of Porto, York University in Toronto, the IIT Institute of Design in Chicago and the University of Arts in London, and more joined #MTF as remote MTF Satellites. The satellites give students access to 50 exclusive talks from around the world - a full conference of inspiring content - in addition to new knowledge and collaboration opportunities.

Activities are very hands-on and culminate in final performance / installations created by all those in the room, and sometimes

in remote collaboration with those participating from various parts of the world. Inspirational speeches are delivered at the launch, and every evening, to inject the atmosphere and stimulate the thinking. During the day a separate zoom room allows for brainstorming sessions with worldwide collaborators. But the main purpose is to evolve works, build collaborations and identify novel research directions which can continue well beyond the intense week of hands-on activity.

THINGS THAT WE LIKE ::

Speculative futurism; Flexible circuits; Bioplastics from agar agar; DIY air quality monitoring; IoT and remote environmental sensing; solar powered portable electronics; analog to digital sensor development; the writings of Jennifer Gabrys, Susan Simard, Robin Wall Kimmerer, Lynn Margulis, Vilem Flusser, and Benjamin Bratton; the new book *The Dawn of Everything* by David Graeber and David Wengrow; biodiversity preservation efforts; rewilding; observer effect in quantum decoherence; quantum entanglement use in telecommunication; the band *The War on Drugs*; hiking; gardening; and everything about my dog Teddy

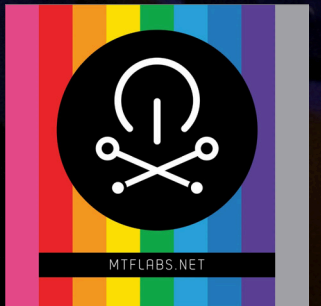
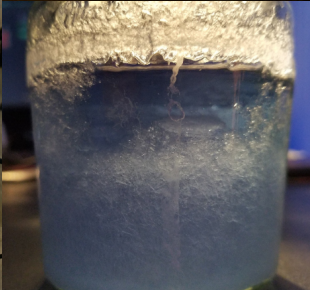
The brave people of Iran ♥
The brave people of Iran ♥
The brave people of Iran ♥
The brave people of Iran ♥
The brave people of Iran ♥

Rajni Perera's travellers and visions of futures to come; The colour of pools; The air brushing my body when I bike;

continued on page 41 ...

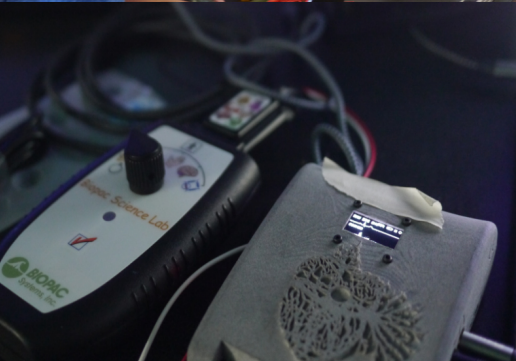
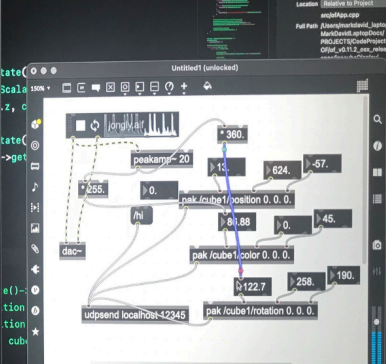
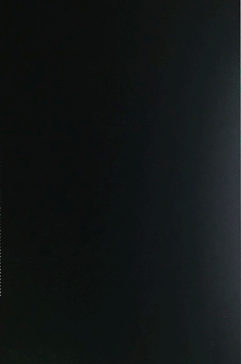
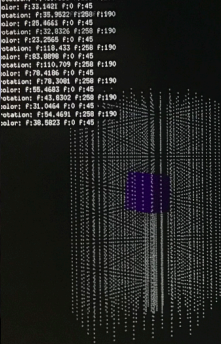
#MTF 2021

The #MTF 2021 satellite event was held by the nD::StudioLab (<https://ndstudiolab.com/>) at York University, Toronto, Canada parallel to the #MTFLabs event in Aviero, Portugal. Led by Ilze Briede [Kavi] Marcus Gordon, and Filiz Eryilmaz, with Kwame Kyei-Boateng, Grace Grothaus, Rory Hoy, Adam Faux, and Kieran Maraj. During the event they explored topics in collaborative interactive performance and interactive installation in the areas of biophysical sensing and biofeedback, live coding, and experimental electronics. These topics were the the foundation to explore themes such as "biofeedback liquid crystallization," and the "Data sharing ocean" a distributed bio-network forming a virtual bio-ecology. The focus will be on working with live data and manifesting it in audible and visual forms.



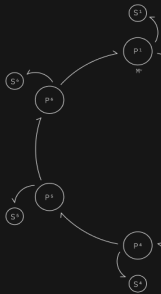
#MTF 2022

The #MTF 2022 satellite event was held by the nD::StudioLab at York University, Toronto, Canada parallel to the #MTFLabs event in Aviero, Portugal. Participants included: Mark-David Hosale, Jacob Cram, Kimberley Davis, Kwame Kyei-Boateng, Marcus Gordon, Grace Grothaus, Hyrsovalanti Maheras, Aftab Mirzaei, Francesc Morales, and Nava Waxman. During the event we explored topics in collaborative interactive performance and interactive installation in the areas of biophysical sensing and biofeedback, live coding, and experimental electronics. We used these topics to explore the theme of Ecosystem Living during the workshop and used the results from the workshop as experimental tools and instruments for a closing performance.



QuasiModo

An Audio Feedback Experiment...



Configuration 1

Physical Loop Format.

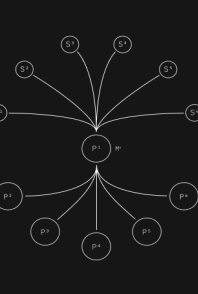
Each performer (P-) uses an audio interface with at least 1 input and 2 outputs. The left output (or output 2) is routed to a monitor. The right output (or output 2) is routed to the input of the next Performer.

Both outputs are to send identical audio signals to their destinations, with the performers either adding to, or modifying the signal as it passes through. We controls the feedback of the loop by adjusting the right output volume (output 2) of their signal.

If the feedback of the loop becomes too great, and begins to self oscillate, we should use the master volume as a kill switch, removing any potential for feedback in the loop. Self oscillation will begin to occur past 90% volume. Recommended to start with a beat and 0 feedback.

QuasiModo

An Audio Feedback Experiment...



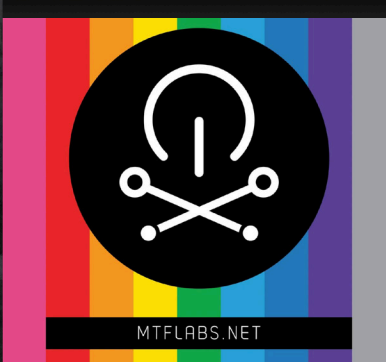
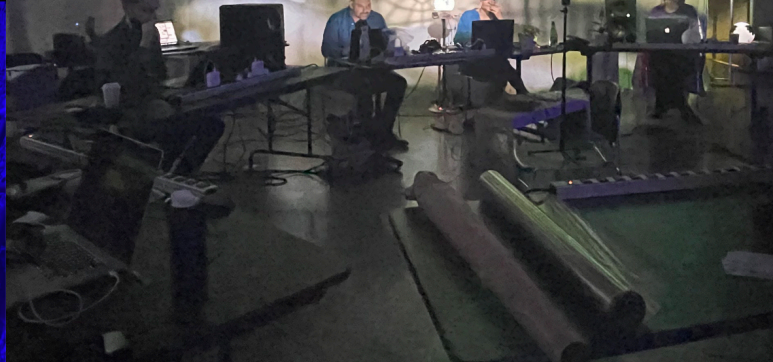
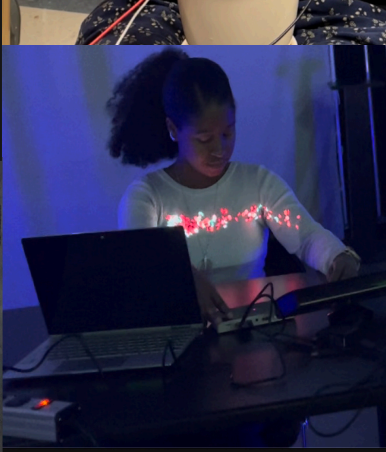
Configuration 2

Virtual Loop Format.

Each performer (P-) uses an audio interface with at least 1 input and 2 outputs. We acts as the master control for the system, and requires an audio interface with 1 inputs and outputs for the performers, and a multichannel outputs for the monitors.

We configures the loop virtually, taking the performers inputs and routing them into the audio loop. They may configure it to be a single loop, or configure multiple loops within the overall.

We also has the ability to select how much of each signal is included in the feedback. They may also choose where the monitors are located for a different experience for the performers. Recommended to start with a beat and 0 feedback.



MTFLABS.NET

the body in\verse

[Artist Talk]*

M.D. Hosale
York University,
Computational Arts
Toronto, Ontario, Canada
mdhosale@yorku.ca

A.J. Macy
Biopac, Inc.
Santa Barbara Center for Art,
Science, and Technology
Santa Barbara, California
ajmacy@icloud.com

A.M. James
Lecturer, Dance and
incoming Ph.D. Student
Music Composition
UC Santa Barbara
alysiamichelle@gmail.com

Abstract

The body in\verse is an online, interactive performance that combines biophysical sensing, emotive state sonification and visualization, and generative poetry to create the scene. The performance provides a deep dive from the world outside of ourselves, that is dissociated by mediated technology, into the interoceptive abyss of our emotive sea. Audience members are invited to participate in a focussed conversation that becomes the basis for the activity that follows.

Keywords

Interactive Performance, Biophysical Sensing, Emotional Affect Assessment, Disassociation, Data Visualization, Sonification

Introduction

The body in\verse is an online, interactive performance that combines biophysical sensing, emotive state sonification and visualization, and generative poetry to create the scene. The performance provides a deep dive from the world outside of ourselves, that is dissociated by mediated technology, into the interoceptive abyss of our emotive sea. Audience members are invited to participate in a focussed conversation that becomes the basis for the activity that follows. Questions will be on the rise of a technological culture, and how it has left us wanting, consciously or not, for identification and awareness of “essential rhythm”, that we continue to lose track of now that we live mostly in cities as the aboriginal

environment recedes from view. The performance environment provides the ability to control the presentation of stimuli and monitor the physical reaction based on the interpretation of nuanced emotional state, blurring the line between auditory and visual real-time content and physical experience.

A biophysical sensing system measures the emotional affect of the performer, and then uses that data to drive the sound, abstract imagery, and a generative poetry algorithm. Emotional affect of the performer is assessed through arousal and valence measures derived from correlation of the performer’s heart rate and heart rate variability. An algorithm generates poetry using conversations that take place with the audience as source material. The poetry source material is then algorithmically organized according to its sentiment (positive to negative), and mapped to the emotional affect of the performer driven by the emotional affect assessment from the biophysical measures as described above.

What happens? What the audience sees and hears... How they participate...

We begin with a conversation.

The performer (Alysia Michelle James) is close to the screen, visible from the shoulders up, like a typical tele-conference call. As the audience joins the call, she begins with some ice-breaker questions such as:

“How are you today?”
“Where are you located?” etc.

Audience members are able to answer these questions through the chat. The questions slowly become more poignant as the performer builds upon their responses.

“Why are you here?”

If an audience member responds with, “I’m here for a meaningful experience,” the performer may respond with a question like, “What is meaningful?”



Figure 1. Still from the beginning of the body in\verse.
©2021 Hosale. James, Macy.

Other examples of questions in this category:

“What is the most important thing we could be thinking about right now?”
“Why be ‘new normal’?”
“Who were you before?”

The perspective moves outward in with questions such as:

“Are you worried about the fragility of society?”
“Are you worried about the fragility of life?”
“What makes a culture?”
“What does society avoid feeling?”

Then we shift to inward thinking with the intent of inspiring contemplation and introspective thought:

“Why do we feel?”
“What do you avoid feeling?”
“Can you feel other humans?”
“Can you feel your breathing?”
“Can you feel your heart?”

This more focused conversation becomes the foundation for the tone and direction for the rest of the performance.

The remaining performance is comprised of three elements:

- A biophysical sensing system that measures the biophysical state of the performer, and then

uses that data to drive the sound, abstract imagery, and a generative poetry algorithm.

- An AI algorithm that generates poetry.
- A performance that combines movement, sound, abstract imagery, and text.

Biophysical Sensing

The science behind this project is based on work first performed by James Russell, “A Circumplex Model of Affect”[1]. This work has been cited roughly 14,000 times. Since 1980, psychophysicologists have continued to evolve theory, in regard to the assessment of feeling “affective” state, and so additional physiological variables have been utilized for evolving studies. These measures include electroencephalogram, pulse plethysmogram, blood pressure, blood flow, vascular resistance and ventilation.

Recent research in bioinformatics suggests that it is possible to assess the real-time emotional state of an individual using a special class of sensors that track human characteristics such as heart rate, muscular movement, eye movement, skin temperature and breathing[2] that contribute to an individual’s emotional valence (range of affect from pleasant to unpleasant) and arousal (range of excitement from activation and deactivation) [3][4][5][6][7][8].

In this work we use a real-time electrocardiogram via a Biopac Bionomadic BN-ECG2[9].wireless data acquisition and analysis platform to establish core valence and arousal measurements to find a baseline affective state assessment of the performer. We ran the output of this amplifier straight into a sound interface capable of measuring down to DC (zero frequency). Valence measures are indexed by the performer’s heart rate variability (HRV) and establish the horizontal model axis ranging from displeasure to pleasure. Arousal measures are indexed by the performer’s heart rate (expressed in beats per minute) and establish the vertical model axis ranging from low energy (calmness, boredom) to high energy (excitement, alarm). The correlation of valence and arousal helps determine the assessment of emotive state, with high valence and high arousal correlating to excitement, low valence and high arousal to anger, low valence and low arousal depression, and high valence and low arousal being serene.

It is through works such as the body in\verse that valence and arousal data of a performer can be used

to develop co-collaborative applications that help increase our somatic awareness and mediate the bi-directional emotive connection of a performer with an audience, other performers, and interactive computational systems.

Generative Poetry

The generative poetry algorithm is based on a layering of text analysis techniques, and driven by the emotional affect assessment from the biophysical measures as described above. The basis for is an artificial intelligence algorithm such as found on the Poem Generators website[10], that uses keywords that map to the biophysical state of the performer to generate poetic text. Keywords are drawn from audience responses in the conversation at the beginning of the performance using a speech-to-text algorithm and used as prompts for AI generated poetry using TensorFlow and GPT-2[11]. The prompt provide the beginning of the poem and the AI completes it. For example, if the audience member states, “doing something I love,” the AI might respond, “doing something I love – which in my life I only get – from myself – and from it – out of the blue.” This is combined with a pre-written poem that is first spoken by the performer, and then by the computer - but cut-up, in the spirit of William S. Burroughs’ Cut-Up technique[12]. The cut-up prewritten poem and the AI generated poem are combined in a call and response between two computer voices. The inspiration for this approach for generating text is inspired by the combinatorial literature techniques as employed by OuLiPo (Ouvroir de littérature potentielle; roughly translated: “workshop of potential literature”)[13]. Through this system we can create a complex and rich system for generating a perceptually endless territory of poetic results.

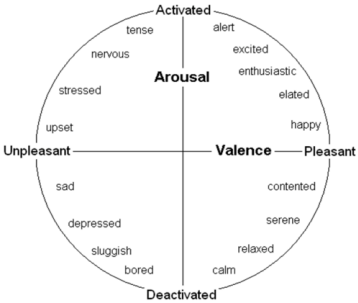


Figure 2. Valence and arousal chart from James Russell, 1980, “A Circumplex Model of Affect.”[1]

Bringing it all together

As the questions become more contemplative, the audience responses are captured and presented on screen. The emotions the performer is experiencing during the performance are also presented on screen via an interface on the lower right side of the screen.

Up until this point the performance is solely focused on the performer’s face, when the last question is answered she begins to move and slowly create space between her and the camera she begins a dance performance and recites the prewritten poem:

Enter the mind and meet the truth that lives there
Don’t accept the limitations society has accepted
Break free of a paradigm
Extend yourself, develop a new sense
Embodied knowing, human connectivity
New forms of association
New ways of seeing
New ways of being
Recognize the world beyond language
Visualize the invisible
Embody the future
Make the world

Once this has been completed the generative – computer spoken poetry begins. There is a feedback loop between the generative poetry algorithm and the performer that is mediated by a biophysical sensing interface. as the generative poetry begins to fade in.

The performer’s movements and actions are influenced by the AI’s poetry, which is being influenced by the emotive analysis of the performer based on her physiological state. The responses will be made in movement, dance and breath while the Bionomadix continues to collect data and generate poetry based on the movements and the heightened state of arousal of her body.

The dynamic performance showcases many emotions through-out the performance. The movement portion of the performance then ends similarly to the way it began – a slow approach to the camera with extra emphasis on breathing as she catches her breath. Her eyes looking directly at the camera and she attempts to calm her breath and heart rate with audible breathing inviting the audience to participate in the rhythm of the breath. She asks again, “How are you feeling?”

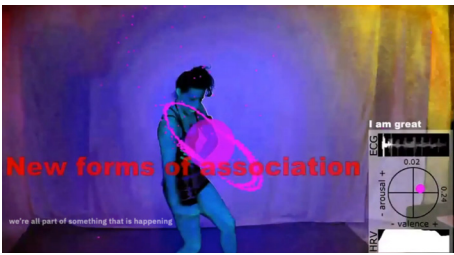


Figure 3. Still from the final scene of the performance with biosensing mapping to colour and poetry overlay.©2021 Ho-sale, James, Macy

The performance ends with a Q&A during which all three artists will respond to questions and offer information about the formation of this project

References

[1] Russell, James A. “A circumplex model of affect.” Journal of personality and social psychology 39, no. 6 (1980): 1161.
[2] Nicolaou, Mihalis A., Hatice Gunes, and Maja Pantic. “Continuous prediction of spontaneous affect from multiple cues and modalities in valence-arousal space.” Affective Computing, IEEE Transactions on 2, no. 2 (2011): 92-105.
[3] Cacciopo, JT, Berntson GG, Larsen JT, Poehlmann KM, Ito, TA (2000) The psychophysiology of emotion. In Handbook of Emotion, 2nd Edition (Eds: R Lewis, J M Haviland-Jones), Guilford Press, New York, pp 173-191.
[4] Chanel, Guillaume, Julien Kronegg, Didier Grandjean, and Thierry Pun. “Emotion assessment: Arousal evaluation using EEG’s and peripheral physiological signals.” In Multimedia content representation, classification and security, pp. 530-537. Springer Berlin Heidelberg, 2006.
[5] Koelstra, Sander, Christian Muhl, Mohammad Soleymani, Jong-Seok Lee, Ashkan Yazdani, Touradj Ebrahimi, Thierry Pun, Anton Nijholt, and Ioannis Patras. “Deap: A database for emotion analysis; using physiological signals.” Affective Computing, IEEE Transactions on 3, no. 1 (2012): 18-31.
[6] Picard, Rosalind W. “Affective medicine: Technology with emotional intelligence.” Studies in health technology and informatics (2002): 69-84.
[7] Scherer, Klaus R. “What are emotions? And how can they be measured?.” Social science information 44, no. 4 (2005): 695-729.

[8] Stickel, Christian, Martin Ebner, Silke Steinbach-Nordmann, Gig Searle, and Andreas Holzinger. “Emotion detection: application of the valence arousal space for rapid biological usability testing to enhance universal access.” In Universal Access in Human-Computer Interaction. Addressing Diversity, pp. 615-624. Springer Berlin Heidelberg, 2009.
[9] Biopac Bionomadix BN-ECG2, Biopac, Inc. website, accessed October 27, 2021, <https://www.biopac.com/product/bionomadix-2ch-ecg-amplifier/>
[10] Poem Generators website, accessed October 27, 2021, <https://www.writerswrite.com/poetry/poem-generators/>
[11] How To Make Custom AI-Generated Text With GPT-2 website, accessed October 27, 2021, <https://minimaxir.com/2019/09/howto-gpt2/>
[12] William S. Burroughs Cut-up Technique website, accessed October 27, 2021, <https://www.languageisavirus.com/creative-writing-techniques/william-s-burroughs-cut-ups.php>
[13] Queneau, Raymond. 1998. Potential Literature. In Oulipo : a primer of potential literature, edited by W. F. Motte. Normal, Ill.: Dalkey Archive Press.

* This article was originally published: Hosale, Mark-David, Alan Macy, and Alysia James *the body in|verse*, Artist’s Talk: ISEA2022: The 28th International Symposium on Electronic Art; June 2022; Barcelona, Spain

Exquisite Shell-ter

The Exquisite Shell-ter is an immersive pavilion created by members of the nD::Studiolab at York University. The pavilion is a repurposing of an artwork, homunculus nimbus (h.n). Using the skeleton of h.n, we will reimagine the shell and interior space as mediums for experiencing a hyperlocal awareness of climate that is shaped by the bodies, imaginations, and experiences that radiate inside and outside of the pavilion. The shell is composed of disparate, but intersecting, elements of light, texture, and sound that are created using the Exquisite Corpse game as a collaborative process between members of the lab. Our motivation is to explore the radiant exchanges that take shape between bodies and the environment. Climate is also a collaborator in this work, where air and atmosphere are invited inside the space, and participants gather to sense and reflect on our connections to the surroundings.



Vertical Panorama Pavilion (2022)
Olafur Eliasson and architect
Sebastian Behmann
<https://www.thedonumestate.com/art/artists/43>



The textile art of Rachel Hayes
<http://www.rachelbhayes.com/>

Semi-opaque coloured acrylic or fabric panels are used to create diffused light inside the pavilion.

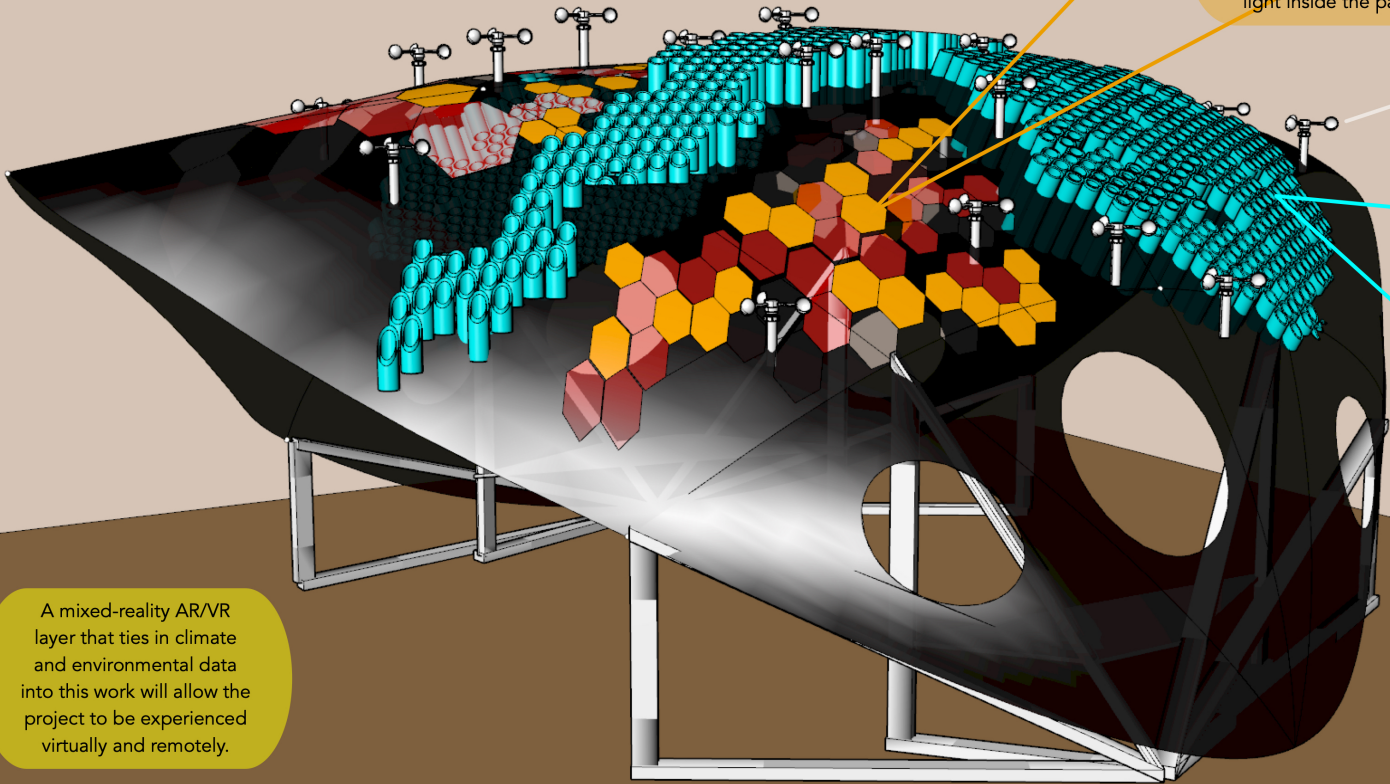
Anemometers, devices for measuring windspeed, will be populated on the skin and used to drive kinetic kaleidoscopic light devices, and sound generators.



Sound elements are created out of pipes and bundled materials, as inspired by instruments such as, aeolian harps, wind chimes, etc.



Aeolus - Acoustic Wind Pavilion (2012)
Luke Jeram
<https://www.lukejerram.com/aeolus/>



A mixed-reality AR/VR layer that ties in climate and environmental data into this work will allow the project to be experienced virtually and remotely.



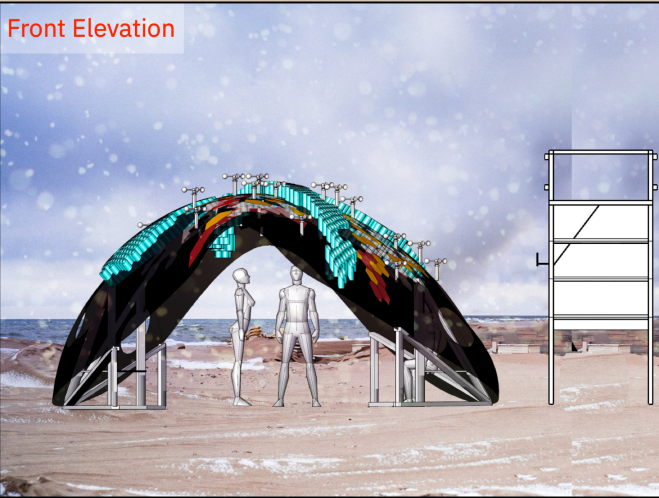
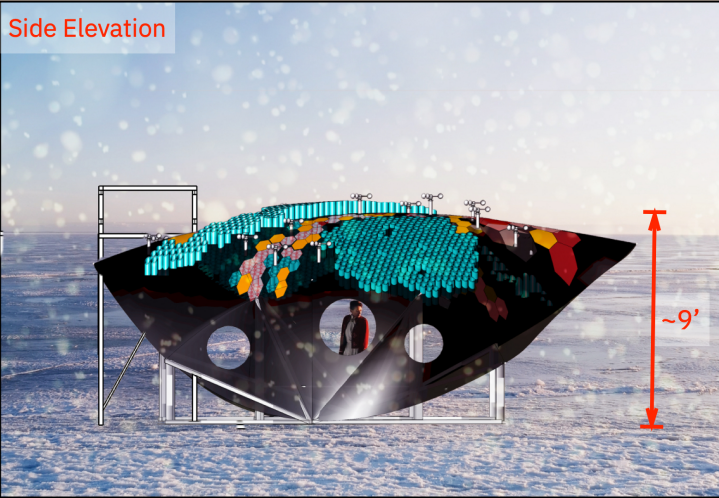
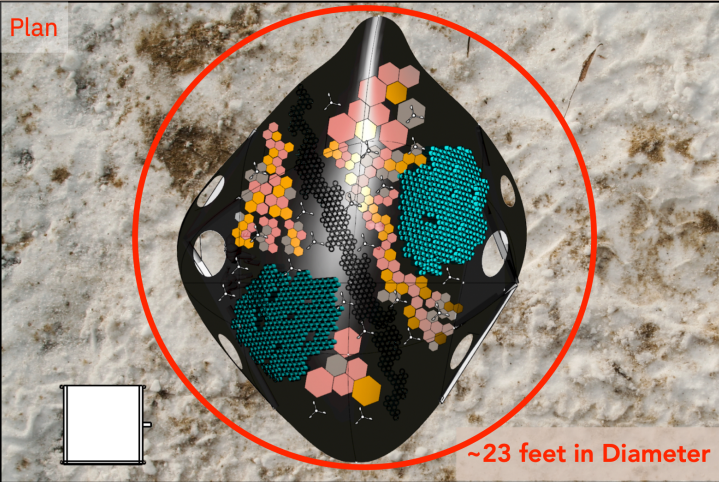
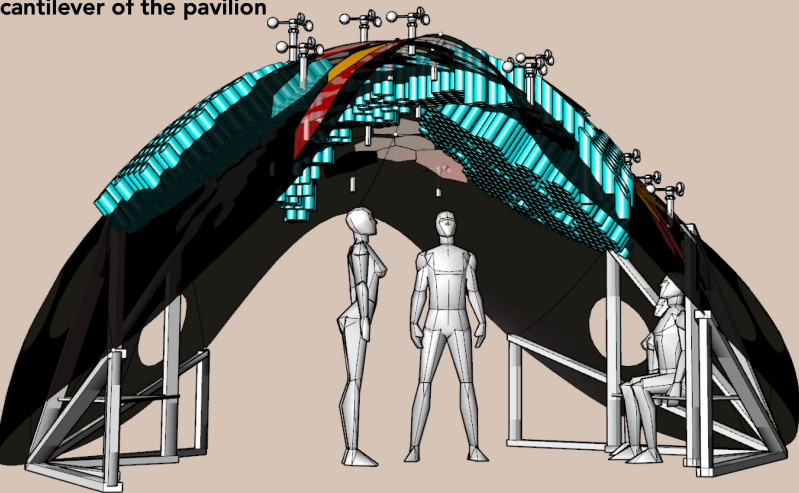
Nick Cave's Soundsuit sculptures (1992, ongoing)
<https://publicdelivery.org/nick-cave-soundsuits/>

Exquisite Shell-ter

The pavilion is made out of PVC pipe and wood. The PVC is cut in 5 foot lengths for easy transport. For easy construction the pieces snap together using PVC joints with cleaves pins holding them in place. The joints are reinforced with aluminum u-channel.

The base supports double as benches and are constructed out of 2x4's and plywood. They are held together with wood screws and carriage bolts. In previous exhibitions the supports were anchored with sand bags as ground penetration was not permitted.

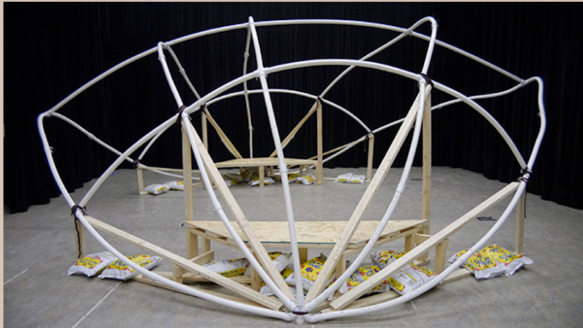
Benches inside the pavilion are arranged to facilitate social interaction and encourage visitors to remain with the work for longer periods of time. In addition, the benches provide structural support for the cantilever of the pavilion



The structure of the work is an up cycling of the work, *homunculus.numbus* (h.n) (2018-19) by Mark-David Hosale.

The frame is made of PVC and wood and will provide the structure for the work

A fabric shell was built already, but not used in the original work. This will be the basis for the covering for this project. It is a 90% block, UV, wind penetrable fabric.



* the three bottom images are actual images, not renders

WHAT ARE YOU WORKING ON?

Grace

A collaborative environmental and plant biodata sonification installation with Fereniki, hopefully to be developed at Centre Phi in Montréal next semester; A post-natural electronic sculpture collaborative environmental data logging project with Racelar and Sarah

Kavi

COMPS COMPS COMPS; 360-degree immersive dome audio/acoustic performance pieces with violinist Amy Hillis and ambisonic sound live coder Hrysovalanti Maheras a.k.a. Fe; weaving skills using unusual materials; online GLSL programming course with Arsiliath (terribly behind!); more-than-human exhibition piece involving point clouds in TouchDesigner for Prof. and artist Jane Tingley's piece called (ex)tending towards; researching and reading about data art and patterns (super exciting); my abs (ok, it is a joke .P); Mobile Gallery project with Roberta Buiani, Lorella Di Cintio and Chinese/Canadian artist Xiaojing Yan; self care and love <3

THINGS THAT WE LIKE 88

Formula 1; Turnips; ROSVAA magazine (on instagram); NTS Radio; Invisible; City Records; Psychic TV; Ebi (not shrimp but the Iranian Pop singer); Sohrab Sepehri's ecotheological poetry; Looney Tunes and Pink Panther backgrounds; The language games of Helene Cixous

Jazz, Improvisation and Architecture (David P. Brown); Close up at a distance (Laura Kurgan); Should I stay or should I go (The Clash) Everything everywhere all at once (film) Zygmunt Bauman

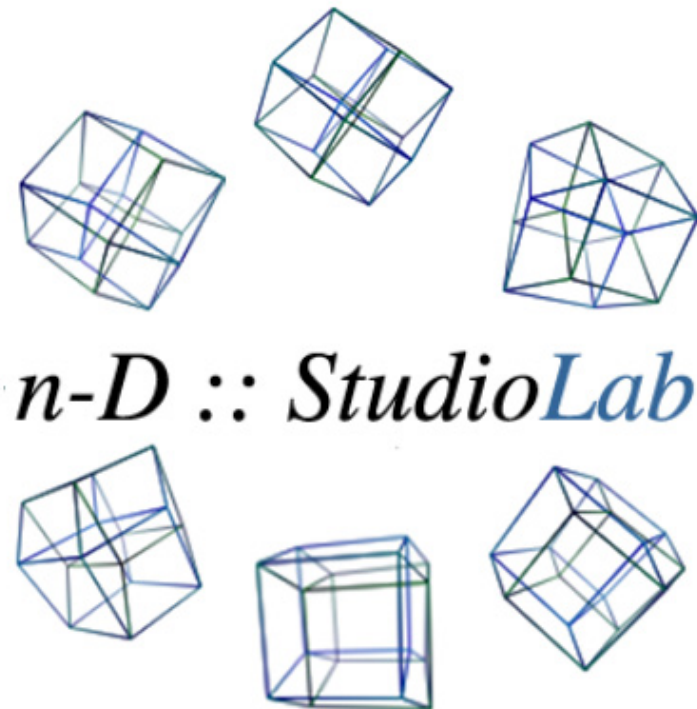
Wind swept snow&sand dunes; desert (eventhough I have never visited one); dubstep; Theo Parrish and Moodyman, Tarkovsky movies; smell of Linden tree flowers; patterns and hidden worlds within; warmth emanating from fire; El Greco; Francis Bacon; Ryoji Ikeda and Ryuichi Sakamoto; experimental video art; analogue machines;

The *n-D::StudioLab* is an adaptable space for research-creation based theoretical discourse, methodological development, and the production of works in the areas of ArtScience, Computational Art, and Interactive Architecture. In addition, there is an emphasis on methodological development in the integration of software development, digital fabrication, electronics hardware development, and sound and vision research with the goal of creating eversive works that blur the divide between the virtual and the real. Since its inception in October 2011 the *n-D::StudioLab* has been involved in the research and development of several works that have been shown internationally in

such places as Toronto's Nuit Blanche, the Deutsches Museum, the Dutch Electronic Arts Festival (DEAF), the Re-New Festival in Copenhagen, the Sydney Biennale, Currents New Media, ISEA International, and the Venice Biennale.

The "n" in *n-D* refers to vast potential and the infinite, whereas the "D" in *n-D* refers to:

- *n*-Disciplinary – trans-disciplinary, blurring boundaries, cross breeding and evolving fields
- *n*-Dimensional – expanding, complex and continuous
- *n*-Domain – trans-sensory, trans-experiential, transmodal



n-D :: StudioLab

Contributing *nD::StudioLab* members

Filiz Eryilmaz, Digital Media, (HBA since 2017, MA Since 2021)
Hrysovalanti Maheras, MA, Ph.D., Digital Media, (since 2018), www.hfmaheras.com
Marcus Gordon, Ph.D., Digital Media, (since 2019), www.magfoto.xyz
Adam Faux, Ph.D., Music (since 2019) www.adamfaux.com
Jacob Cram, MA, Digital Media (since 2020) jacobcram.xyz
Aftab Mirzaei, Ph.D., Science and Technology Studies (since 2020)
Ilze Briede [Kavi], Ph.D., Digital Media (since 2020), www.ka-vi.com
Kwame Kyei-Boateng, MA Digital Media (since 2020)
Grace Grothaus, Ph.D., Digital Media (since 2021), www.gracegrothaus.com
Eyal Assaf, Ph.D., Digital Media (since 2022)
Kimberly Davis, MA Digital Media (since 2022)
Nava Waxman, Ph.D., Digital Media (since 2022), www.navawaxman.com

