

Editorial.

radical matter is snakes and ladders.
radical matter is 10²³.
radical matter is trillion trillions sticky cohensions.
radical matter is gaming the game.
radical matter is topological flakes warping over time.
radical matter is the portal.
radical matter is the blues on a hot Memphis night.
radical matter is excremental philosophy.
radical matter is fluxus gone wild.
radical matter is collective shapeshifting self-assembly.
radical matter is drone consciousness at 2am.
radical matter is 0 + 1 writ tiny tiny.
radical matter is 21st century storytelling.
radical matter is wake work on the high seas.
radical matter is distributed intelligence sucker-vision in a single body.
radical matter is a room full of ChatBots in seven 2-second dance sequences.
radical matter is the photograph of thought.
radical matter is batshit navigation.

radical matter is STEM on steroids.
radical matter is humouring quicksand.
radical matter is a dandified romp through life.
radical matter is proliferating edges that are not edges.
radical matter is emergence as groundless ground.
radical matter is error as counting.
radical matter is flow over stasis without necessarily going anywhere.
radical matter is neither infinitely large nor infinitely small.
radical matter is walking purposefully and without direction.
radical matter is playing with the invisibles.
radical matter is nonlocality saying hello.
radical matter is flame throwing mytho-poetics.
radical matter is minor literature.
radical matter is 4'33.
radical matter is the circulation of trauma.
radical matter is ana-material, not neither immaterial nor virtual.
radical matter is the transubstantiation of sense.
radical matter is who or what is doing the waving not just the wave.
radical matter is exquisite method.
radical matter is resplendent.

radical matter is gay science.
radical matter is a teardrop.
radical matter is murmuration.
radical matter is Hiroshima as infinity rooms.
radical matter is the new arcades project.
radical matter is the Klein bottle sawed in half.
radical matter is alchemic materiality.
radical matter is A=A.
radical matter is entanglement.
radical matter is nonconscious cognition.
radical matter is the fabric of curved spacetime.
radical matter is a *dispositif*.

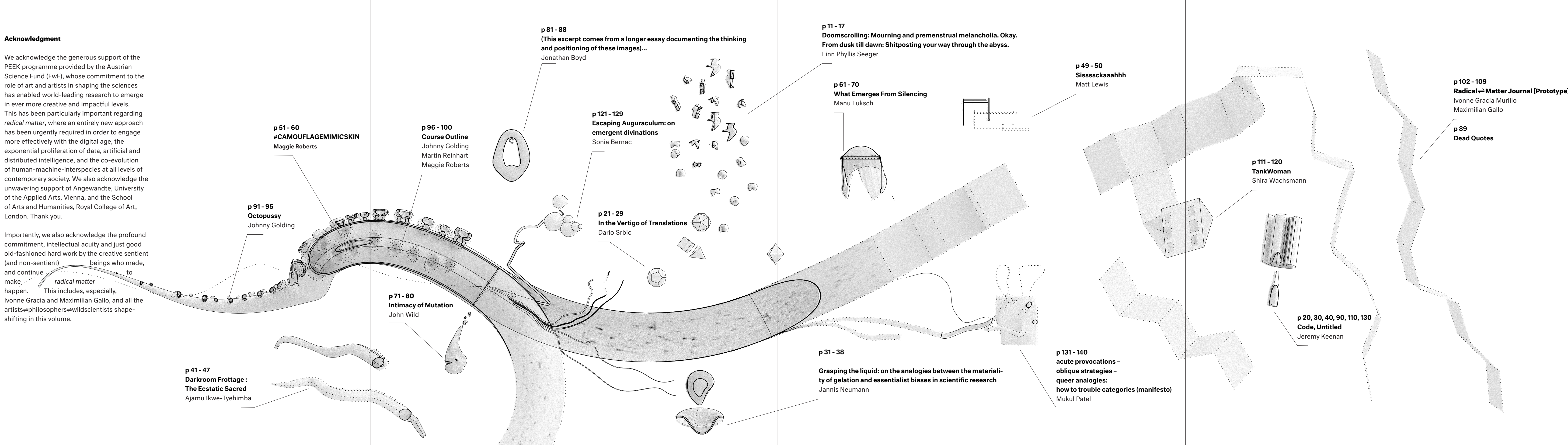
radical matter is the ethical community.
radical matter is the ontic 'is'.
radical matter is ecstatic fetish.
radical matter is the fairy tale in mourning.
radical matter is the techné of logic.
radical matter is chemo-psychedelic-tactility
radical matter is dither.
radical matter is generative code.
radical matter is the secret life of fungi.

radical matter is the cock owed to Ascepius.
radical matter is a democratic imaginary.
radical matter is 21st century currency.
radical matter is a warm robotic autonomous system.
radical matter is a synthetic wave.
radical matter is friendship.
radical matter is guerilla warfare.
radical matter is the thickness of the surface.
radical matter is knowing how.
radical matter is unknowing.
radical matter is without care.
radical matter is good old-fashioned data loaming.
radical matter is the right to be bored.
radical matter is geometrical frustration.
radical matter is proliferating data.
radical matter is grey scale.
radical matter is palimpsestuous.
radical matter is silent noise.
radical matter is simultaneous.
radical matter is the darker side of matter, the blacker side of holes.
radical matter is wild science.
radical matter is technicolour lo-fi.
radical matter is founding the object.
radical matter is as far as it goes in any direction all at once.
radical matter is folding the swerve.
radical matter is vibration, moisture, noise.
radical matter is swerving the fold.
radical matter is skin.
radical matter is habeas corpus.
radical matter is as far as it goes and no further.
radical matter is the fractal difference of sameness.
radical matter is not about the Internet of Things.
radical matter is accidental on purpose.
radical matter is relentless.
radical matter is an analytic compass.
radical matter is the 8th deadly sin.
radical matter is jellyroll.
radical matter is dirty.
radical matter is tx-transformed.

Acknowledgment

We acknowledge the generous support of the PEEK programme provided by the Austrian Science Fund (FwF), whose commitment to the role of art and artists in shaping the sciences has enabled world-leading research to emerge in ever more creative and impactful levels. This has been particularly important regarding *radical matter*, where an entirely new approach has been urgently required in order to engage more effectively with the digital age, the exponential proliferation of data, artificial and distributed intelligence, and the co-evolution of human-machine-interspecies at all levels of contemporary society. We also acknowledge the unwavering support of Angewandte, University of the Applied Arts, Vienna, and the School of Arts and Humanities, Royal College of Art, London. Thank you.

Importantly, we also acknowledge the profound commitment, intellectual acuity and just good old-fashioned hard work by the creative sentient (and non-sentient) beings who made, and continue to make, *radical matter* happen. This includes, especially, Ivonne Gracia and Maximilian Gallo, and all the artists=philosophers=wildscientists shape-shifting in this volume.



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#CAMOUFLAGEMIMICKSKIN

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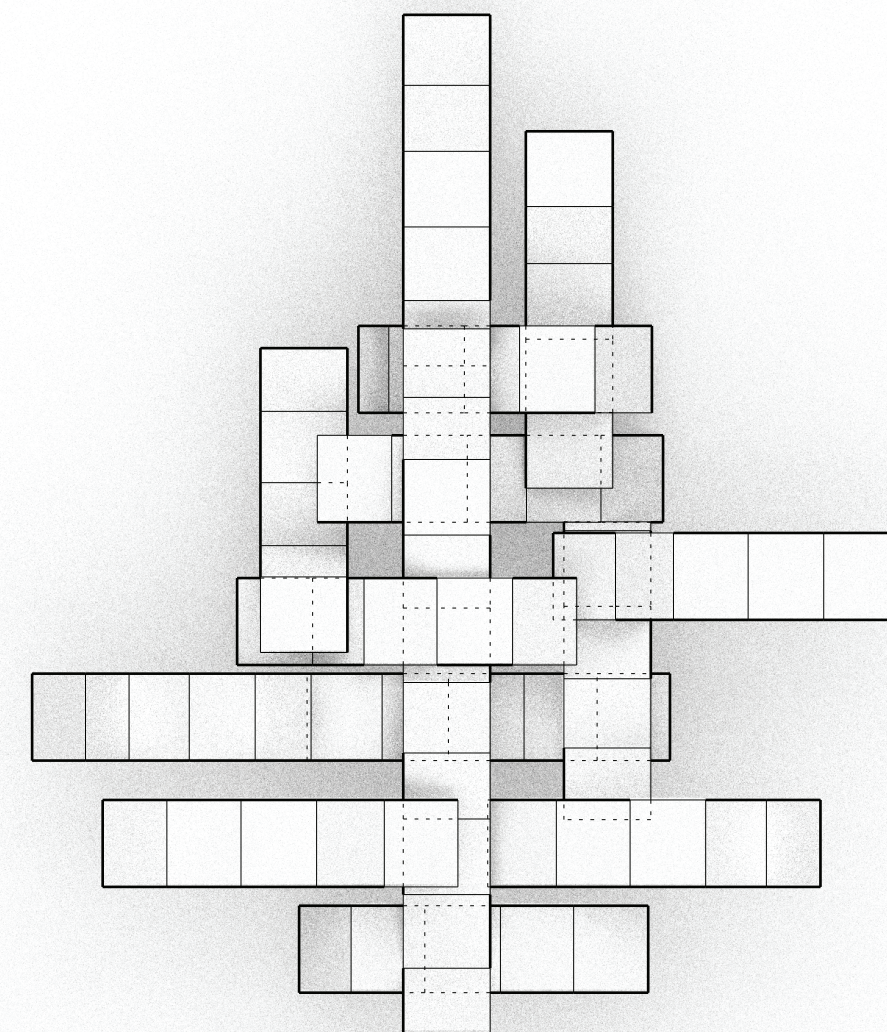
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John Wild

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Darkroom Frottage: The Ecstatic Sacred

Ajama Ikwe-Tyehimba



Contributors

Ajamu Ikwe-Tyehimba

Ajamu is a fine art studio based / darkroom led photographic artist and scholar. His work, theoretical provocations, aesthetics unapologetically celebrate black queer bodies, the erotic, sex, desire, and the politics of pleasure. In 2022, Ajamu was canonised by The Trans Pennine Travelling Sisters as the Patron Saint of Darkrooms. ajamu-studio.com

Dario Srbic

Dario Srbic, Berlin, Germany and London, UK Dario started coding as a twelve-year-old and always felt that the machine was not merely executing the code, but also emanating an inexplicable sensuousness. Initially fascinated by the dark arts of algorithmic trading in the business world(s) he transitioned through philosophy into the equally dark sciences of algorithmic art. His current practice examines the embodiment of desire (arousal, pain, excitement) into code and expresses it in artificially (ready)made sculpture and performance. He holds an MA in Photography from Central Saint Martins and is currently studying for a practice-led PhD at Royal College of Art.

Ivonne Gracia Murillo

Ivonne is a Graphic-UX designer, at the Art & Science programme of the University of Applied Arts Vienna. She is interested in language, human-machine correlation, and researches on questions around personal archives, idea generation and the role of physical senses in memory recording, with a practice moving in between art and design. [@lets.von](https://lets.von)

Jannis Neumann

Jannis Neumann is an artist with a background in biology, psychology and education and a master's de-

gree in Art & Science from the University of Applied Arts Vienna. He works at the intersections of performance, drawing, collage, video and written text. His broad interest in unraveling the complexity of the world, both inside and outside of the human realm, often lead him to transdisciplinary, queer and playful approaches. Reoccurring themes in his work are hybrid forms of being, scientific research and everyday understanding as well as an inquiry of the Western perspective on zones of liminality and ambiguity. @jannnnnnnnnnnnn

Jeremy Keenan

Jeremy Keenan creates artworks using motion, sound, feedback, data, and light. Jeremy is a co-founder of the London, UK sonic arts collective Call & Response. He is of no known relation to the anthropologist of the same name. jeremykeenan.info

John Wild

John Wild is a London based artist who works across performance, sound, text, code, electronics and machine learning to carry out speculative research into the futures imminent within digital technology. johnwild.info

Johnny Golding

Johnny Golding is a philosopher/poet. Born in New York, lives and works in London. Studied at the Universities of Toronto and Cambridge. When times were dark and haunted, she built a house. Likes the company of wild mustangs, big boned cats and, more recently, sentient beings of the 8-legged variety. Holds the chair as Professor of Philosophy and Fine Art at the Royal College of Art (London)t, is PI on two Artificial Intelligence Design labs with Hong Kong Polytechnic, head of the proto-Centre in Radical Matter at the School of Humanities, RCA. Golding's take on contemporary art, philosophy and the wild sciences has been given strong support over

many years by FwF PEEK (Austria) / Angewandte, University of the Applied Arts Vienna. Has a particular penchant for Memphis blues, ska, and jellyroll (but not necessarily in that order). rca.ac.uk/more/staff/professor-johnny-golding/

Jonathan Boyd

Jonathan Boyd is an artist (of sorts), jeweller (of sorts), writer (of sorts), Reader (of jewellery) and Head of Applied Art at the Royal College of Art in London. Jonathan makes artworks which relate to language, material, technologies, things, stuff and meaning making. Artworks are exhibited internationally and held in major public collections including the Boston Museum of Fine Art, V&A, National Museum of Scotland, Pforzheim SchmuckMuseum and Nelson-Atkins Museum. His writings (including things) often seek to destabilise, question and explore the notion and action of reading/understanding.

Linn Phyllis Seeger

Linn Phyllis Seeger is a cloud-based artist and PhD Candidate at the Royal College of Art in London. Seeger's work explores the responsibility the networked individual has within the circulation and retention of personal and global crises, and the collective (unpaid) labor of history-writing through the (shit-) post. linn-phyllis-seeger.com

Maggie Roberts

Orphan Drift (co-founded by Maggie Roberts and Ranu Mukherjee) has explored the boundaries of machine and human vision since its inception in London in 1994. In its latest manifestation, the collective as avatar considers AI through the somatic tendencies of the octopus. Projects in development include 'Nine Brains', our first VR/ XR work that assumes an octopoid worldview as a means of playing with and questioning the presence of AI in current narratives of futurity. 'ISCR1', partnered by the Serpentine

Gallery London's Creative AI Lab, is a cephalopod machine encounter collaboration with ML consultancy, Etic Lab. orphandriftrarchive.com

Manu Luksch

Through her films and art works, Manu Luksch researches the effects of emerging technologies on daily life, social relations, urban space, and political structures. Her current focus is on corporate-governmental relationships and the social effects of predictive analytics in the algorithmic city. Her works have ended up everywhere from street protests in Hong Kong to a Parliamentary Seminar in the Palace of Westminster, from a mobile cinema in the foothills of the Himalayas to the Collection Centre Pompidou in Paris - as well as film festivals, collections, conferences and exhibitions internationally. ManuLuksch.com

Martin Reinhart

Martin Reinhart is a restless inventor of things and ideas. He can neither let go nor give up and therefore sometimes appears as an almost pathological optimist. The longing to create systems also informs his work, which is always about establishing or uncovering connections, the more unimaginable the better. More than filmmaking or writing - both of which he loves - discussions and lectures are his preferred media. Like jazz, they allow him to improvise and react to the unexpected and new. Works and lives in Vienna. reinhart.media

Matt Lewis

Matt Lewis is a sound artist and musician whose practice focuses on sound and the social. He has exhibited and performed nationally and internationally in countries including Austria, Brazil, Portugal, Serbia and the USA, in festivals and venues such as Whitechapel Gallery, Café Oto, The Roundhouse,

Diapason NYC, MK Gallery, Turner Contemporary, and Centro Cultural Sao Paulo. From 2012-13 he was an Artist Fellow at Central St Martins and was twice a resident artist with Metal Culture. Matt is a Senior Tutor at the Royal College of Art where he leads the Sound Pathway and is co-founder of the Polisonics Research Community, previously Matt taught at CSM, University of Greenwich and LCC. Matt was co-founder of Call & Response, one of Europe's only independent sound spaces and co-editor of an upcoming book on sonic justice to be published in 2023. Matt has a PhD from Goldsmiths. linktr.ee/matt_lewis

Maximilian Gallo

Maximilian is an architectural designer working in between cultural studies and architectural practice in Vienna, Berlin and Asturias. He mediates information and experience through publications, buildings and workshops. Within his building practice he aims to develop ecologically and energetically sound solutions, mediating between contemporary spatial visions and traditional construction methods, between the urban and the rural, ruins and palaces. @maximiliangallo

Mukul Patel

Mukul is a London-based intermedia artist and researcher whose practice spans writing, computation and installation, alongside composing for dance, film and environments. His work deploys open, sustainable processes and tools that recentre technological structures around community. Formally, he's informed by North Indian music, the evolution of electronica through the 1990s, OULiPo and 1960s conceptual practice, mathematics, and the relational turn in the sciences. Since 2001, he has codirected Ambient Information Systems, a studio for critical, participatory works, with Manu Luksch. emergence.is

Shira Wachsmann

Shira Wachsmann (born and not yet dead), her main media are moving- images, installations, collages and drawings. Engaging in multi-threaded, non-linear, collective and digital storytelling, often involving non-human entities. She is interested in how narratives and realities emerge. She exhibited in numerous solo and group exhibitions around the world and her works are in various private and public collections.

Sonia Bernac

Sonia Bernac is a writer and a PhD researcher at the Royal College of Art. Her work, framed as 'A bestiary of distributed intelligence', makes sense of algorithmically distributed wisdom(s), swarms/murmurations of data and generative AI. She pays particular attention to the emergence of pathological forms of storytelling: exclusionary, compulsive or sadistic fictioning. bernac.org

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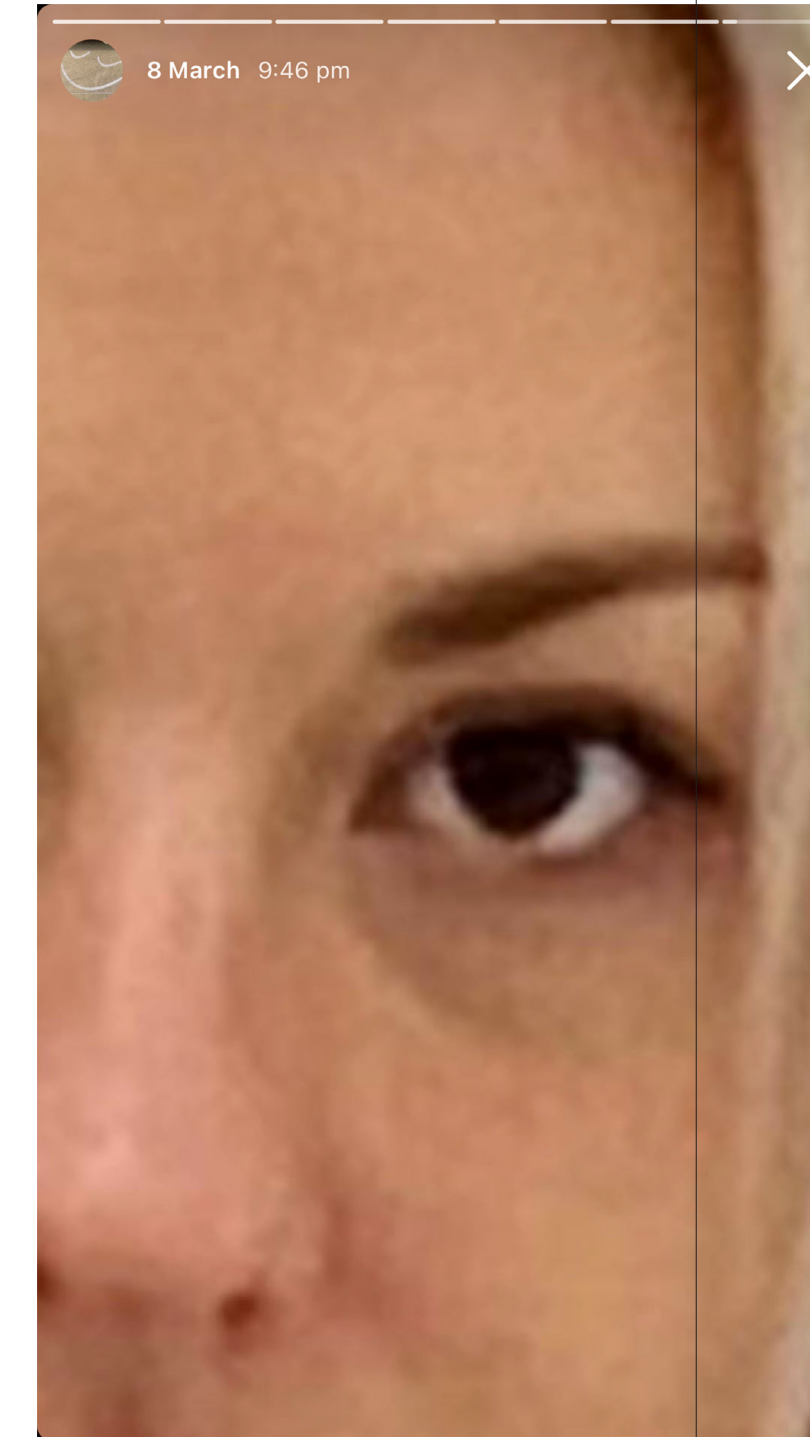
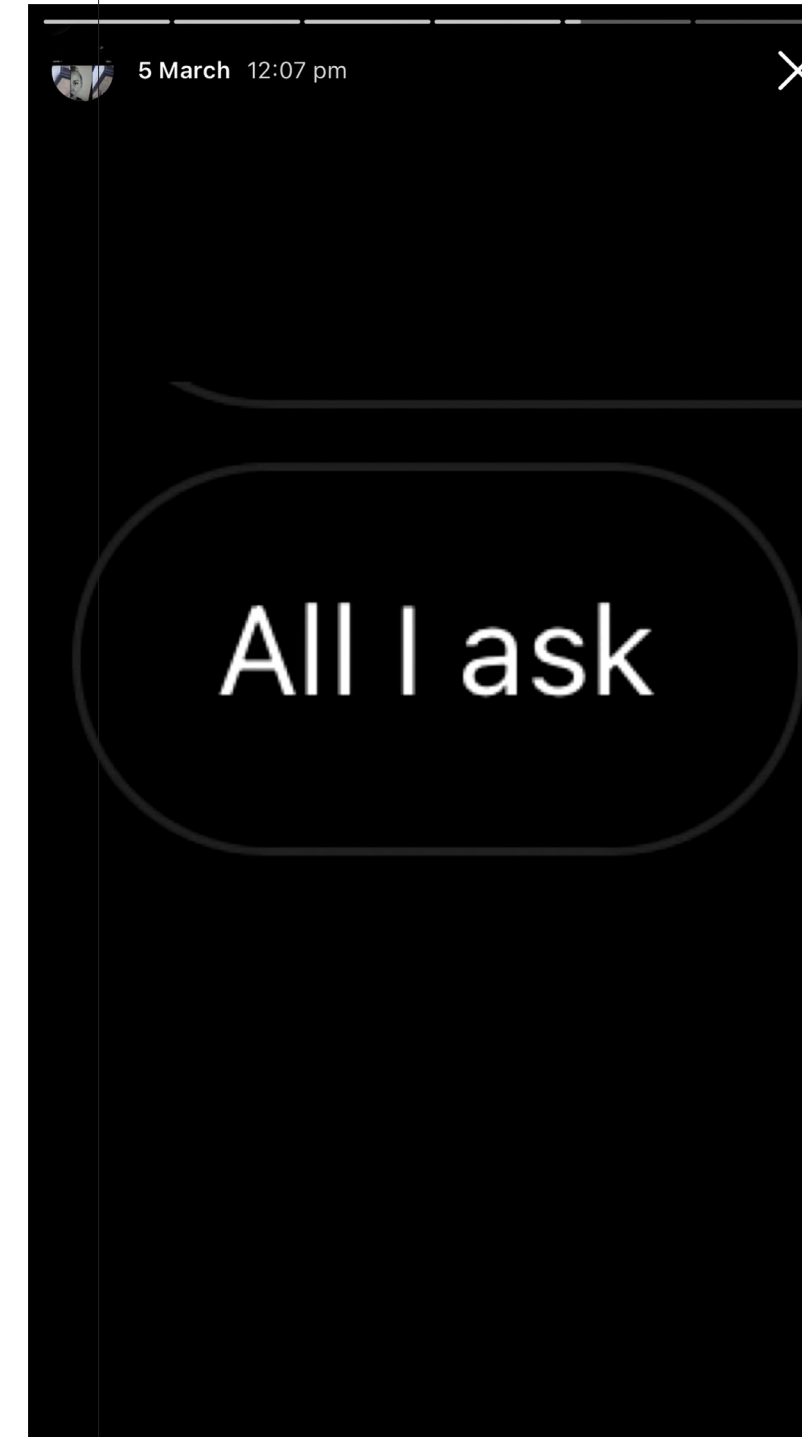
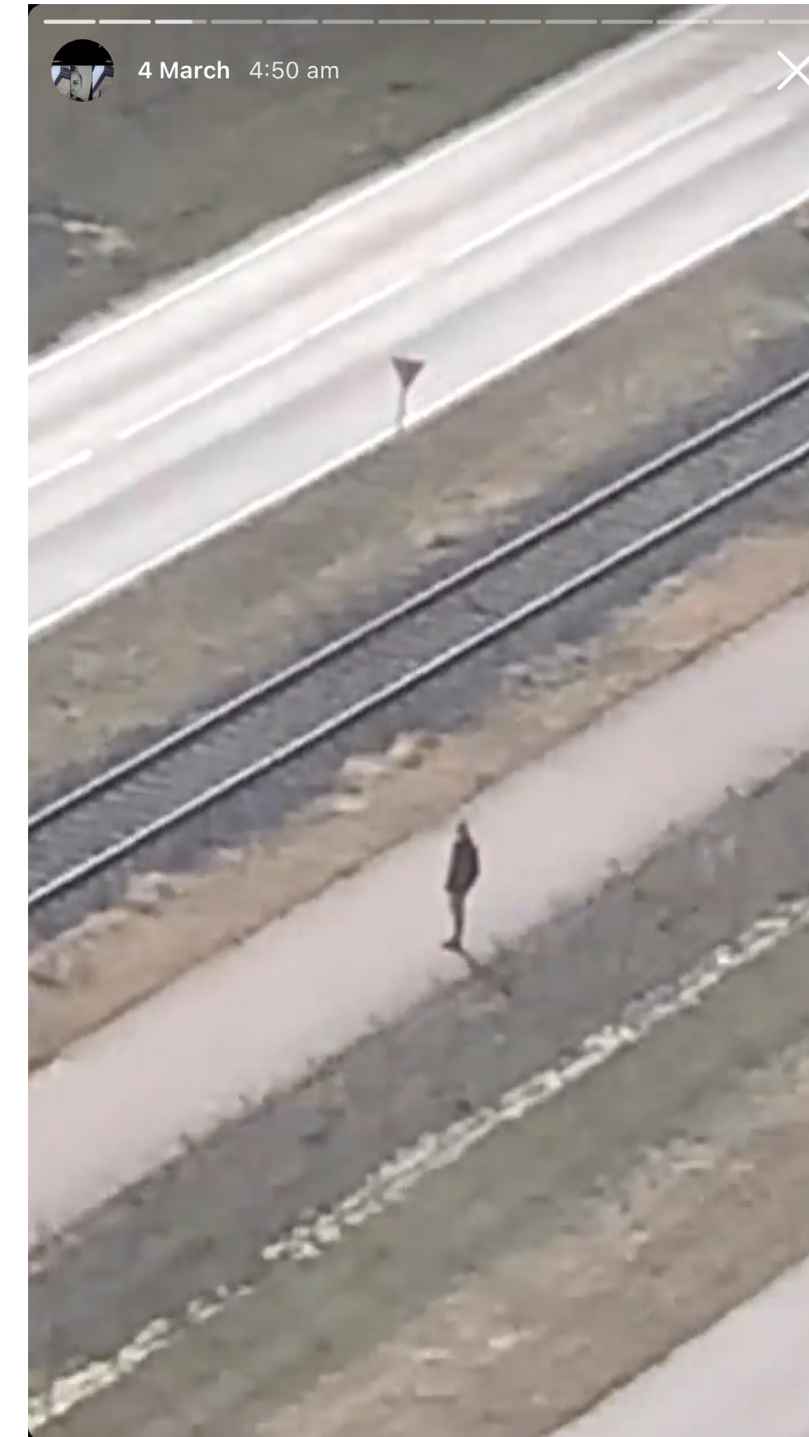
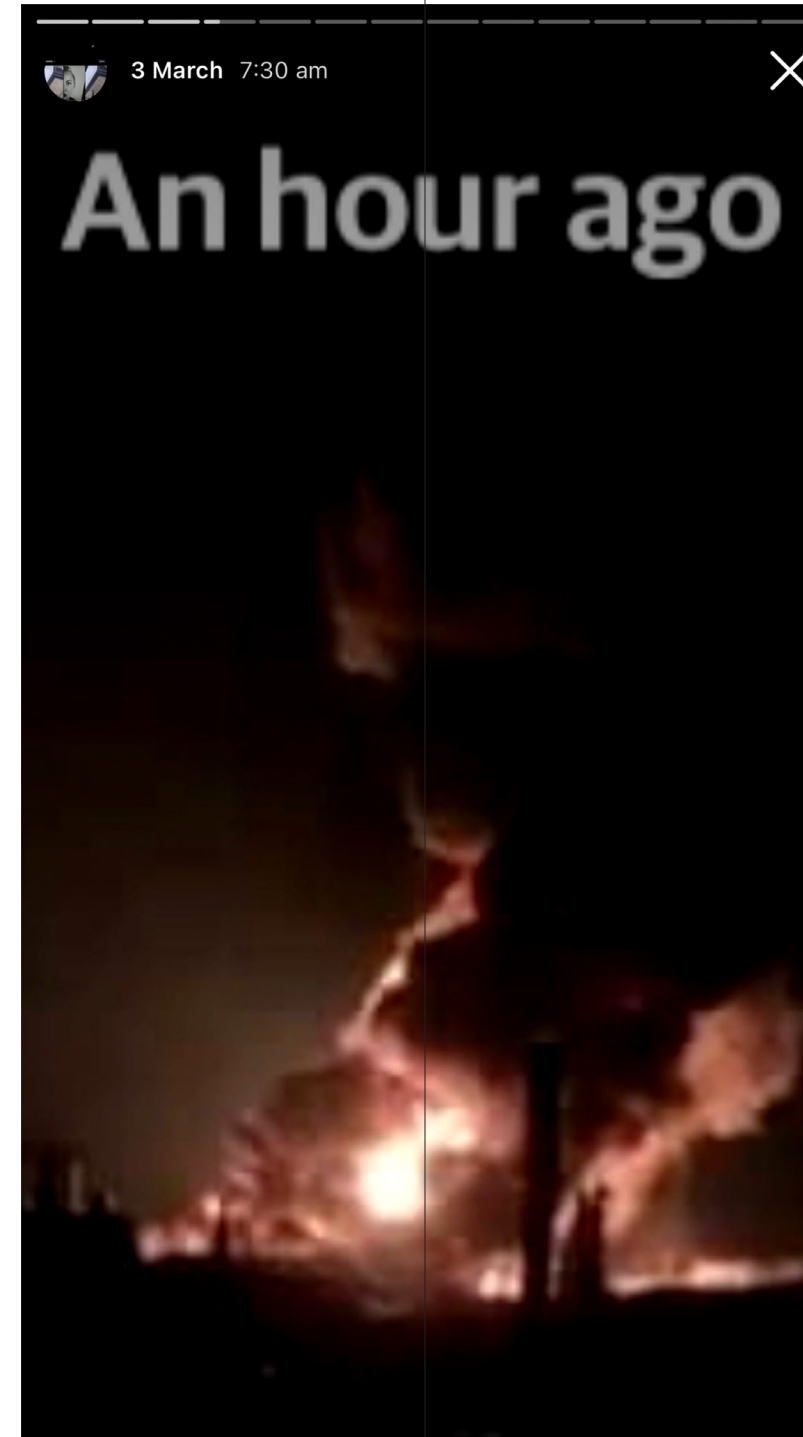
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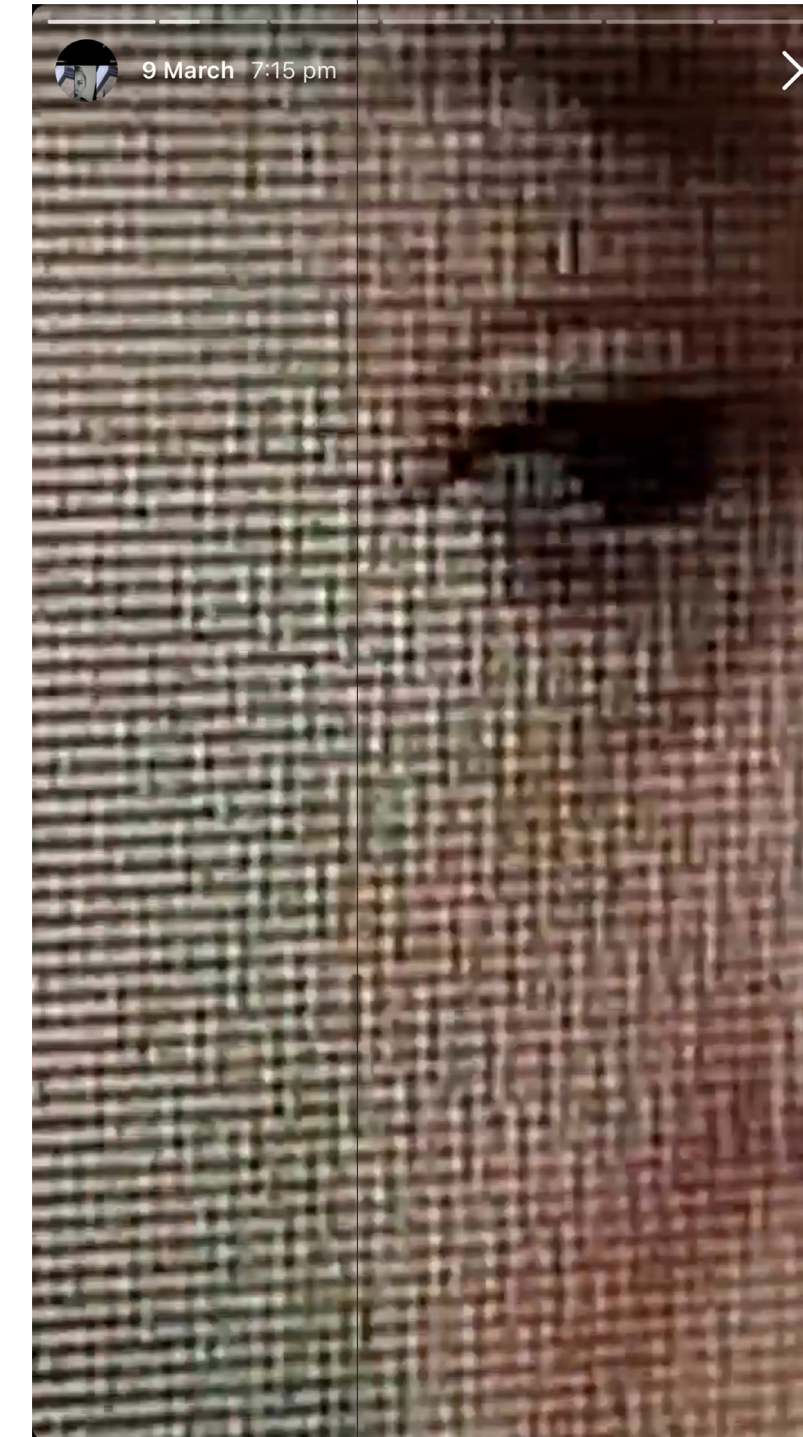


Doomscrolling: Mourning and premenstrual melancholia.
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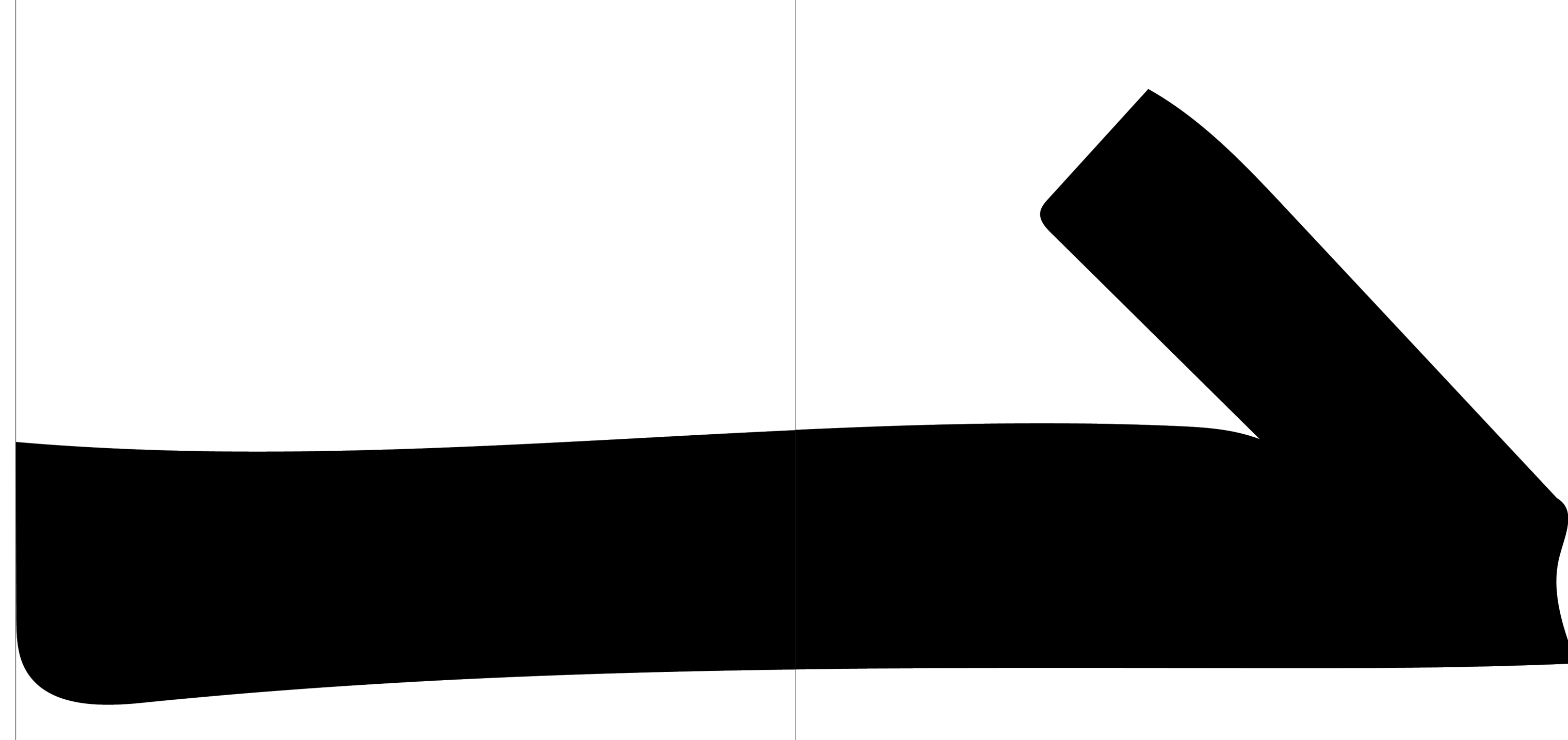
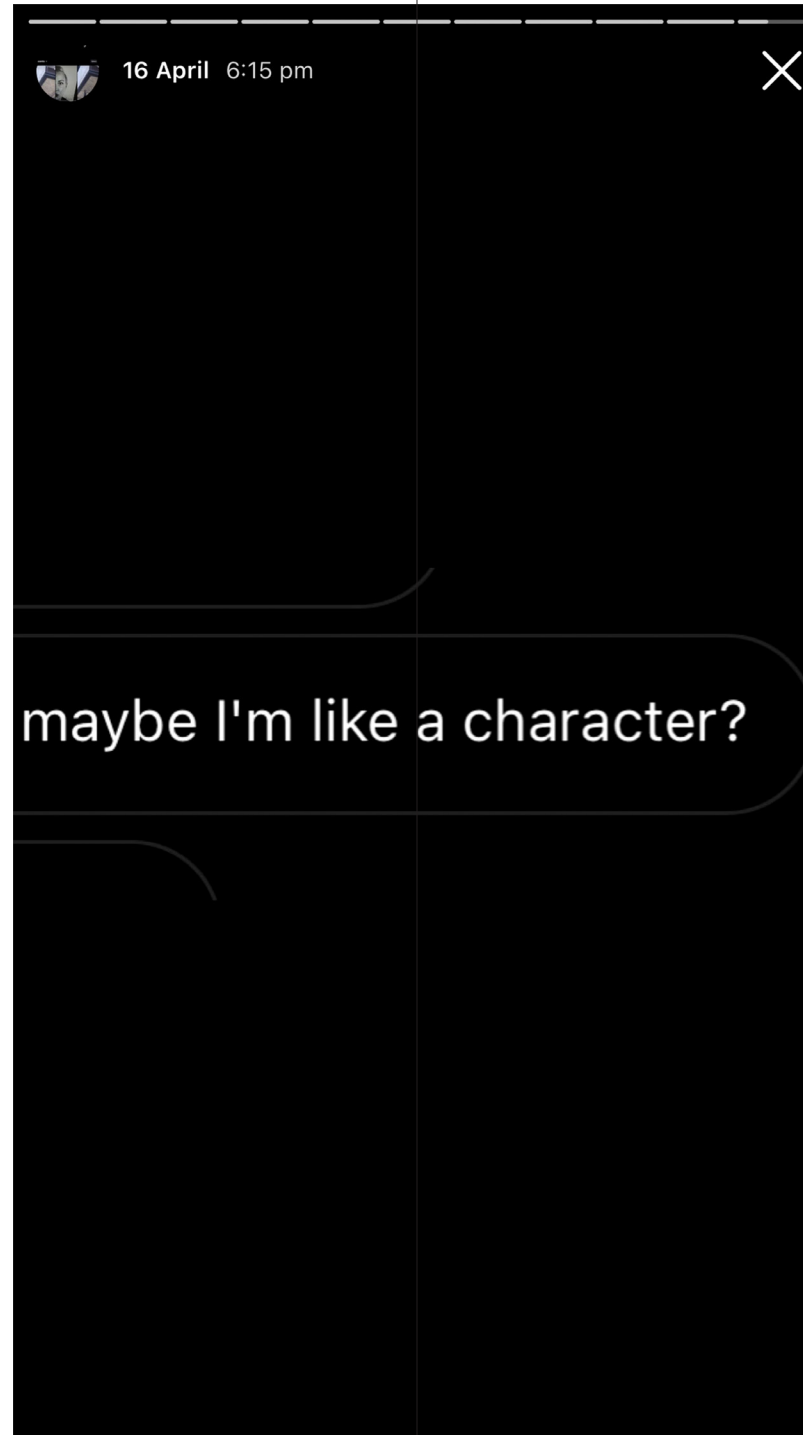
Trigger warning: sex, suicide, moderate violence, crude humor.



Hello. Thank you for your email. My Google Drive is the saddest thing in the world. We are in the midst of a paradigm shift and I'm choosing availability. Semi-passionate things that end badly are circulated within self-extinguishing stories. An economy of stress. All I want is for my ankles to be warmer. I woke up, I opened my eyes, and I scrolled all the way back. What did I do with those bloody desires? Summer went by and I have a cold burrito staring at me. I'm reliving my reveries trying to feel something. My brain wasn't designed to consume all these layers of time and narratives and goodbyes. People just pass time now. The algorithm knows heaven on earth is doing the things you love with the people you love. This is how you make an experience that people remember. But my energy is way too valuable for that. With respect, I'm taking my heart off the table. It's good to hibernate if that's what you need. Stalk me anywhere you like. I do a lot of things I probably shouldn't be doing, in a multitude of third places. Everything is transaction. Spiderman is the reason I'm not a believer. Last year I spent a million pounds on vintage wine. Now, strange, horny game ads are flooding social media. I just tap for more, ceremonially. Ten people were shot and no one died. One friend called me, and now is gone. The future is happening immediately. It tastes like I'm thirsty on a long car journey and the windows won't open. I feel humbled by the desire to live, but in a hopeless way. Like that time I got into a fight at a hot dog stand, and thought that's the closest I'll ever get to being a man. All I want to do is tuck my phone in and take it out again. I think spring did it to me. Broadcast the real-time experience of that moment a woman realizes she either has chlamydia or is pregnant. I am dumping my diaries on my semi-anonymous social media following. And I like how this obscures everyone. The word diarrhoea has never been said to me so many times. The magnitude of environmental destruction undermines the value of planning long term in advance. Life is pure in its ignorance. I ushered into the chat and only found more sadness. And still it's hard to be a goth. There are too many ways to send memes to each other. I couldn't believe it really: one day he was alive, the next day he was dead. The unpaid labor of living through history together. The cloud is not a nebulous place. I'm just lost in a labyrinth I have created for myself. I like waking up to a crossword and a fresh cup of cold brew. The perfect diet for a supervillain. My mouth just went on a journey. I have manufactured a completely frivolous world for me to live in. A rabbit-warren an-architecture of croissants and crayons, where strippers are doing things I never thought were possible. Killing time with my own flock of melancholic mutuals. Bless their little cotton socks. I don't really want to do things on Sundays unless it's sex. My body is a prison. I



can't wait to take a shower and put on cowboy boots. What am I gonna do with this limb of glass? My screen is not opaque anymore. Shattered and fragmented like the parts of my psyche that I will never regain. I've never really tried to undo. Small everyday story replies are the heartbeat of my life. I am suffering from a severe cognitive dissonance that makes me want to do the same thing I do everyday again. But I'm stuck in the age of technological specification, and an apartment I can't afford. After all, love is something that you grow in your server farm. Airdrop rejection is the worst feeling. I hope that doesn't happen to me when I get older, that I look like I have another human inside of me who is approachable. Sometimes I just wish to be an idiot and scare people out at bars. See how much memory I have left. Instead, I feel energized by the ritual practice of reproducing my life as a connected chain of events until it's a whole mood. Posting is not a solitary practice. It's about a collective sense of online dysmorphia. It feels like it's 5 o'clock in the morning on a lovely day. A great day to trample on the truth. When shall I post? Within the siloed environments of socio-immunological micro-climates, I need strategies to deal with the sugar coating on the cake of torment: distributed intelligence circulates different forms of intimacy, and they shape-shift. Do you trust me? I'm not playing. I'm just deconstructing myself on various devices. It's a work of fiction. Any similarity to living accounts, active or deleted, or recent private chats, is purely coincidental. I was born and I'm still here. Accumulating little pieces of non-death: canned laughter, bottled tears; a picture, a film, or gut health videos on TikTok. I have the ability to get aggravated about anything. And it takes the age of the universe to reverse it. Expectations of explicitness are countered by murmured, enigmatic utterances, as we get older and older and older. And I'm waiting, waiting, waiting. I don't know for what. Testimonials of survival. What is this ball of fire doing hovering in the middle of space? It could be a pathway of some sort, to test, reconceive and play the potential force of nostalgia against itself. Last seen just now. If it's either sex or nostalgia, I'm choosing sex. I think I never told anyone. You can't do it if you don't have a bank account. The individual is monitored and mapped into the technosphere. Synced within a chronological sense of time that suggests a beginning, a story that unfolds and eventually, is deleted. In this onto-epistemological economy? I'm not immortal, and I don't have time for this. This is not a decision I have taken lightly. If you require pastoral assistance please ask a stranger if they, too, feel like they are both the main character and the dominant narrator of their own life, and which implications this has on what it means to write history at all, and who is authorized to write it. I will respond upon my return. Thank you.



```
Code Untitled

Jeremy Keenan

Server.local.options.numOutputBusChannels = 6;
(
  //https://github.com/jeremy-keenan/dither-tremble-leap-continue

  s.waitForBoot{
    Buffer.loadDialog(action: {arg buffer; ~b1 = buffer.read(buffer.path)});
    Buffer.loadDialog(action: {arg buffer; ~b2 = buffer.read(buffer.path)});

    //re-enter-before-the-beginning
    ~b3 = Buffer.alloc(5, 44100 * 8.0, 1);

    //continue
    ~gn = Group.new;
    ~prc = Group.new(~gn, \addAfter);
    ~mx = Group.new(~prc, \addAfter);
    ~rc = Group.new(~mx, \addAfter);
    ~scl = Scale.minor(\just);
    ~gns = Array.with(\add, \cns, \bnd, \grn);
    ~dsp = Array.with(\rsn, \fng, \ptchr, \phsr, \sptchr, \brck, \svf, \nfvrb, \scmb, \cmb, \rctcmb, \psp, \trm, \cnp, \svf, \dl, \chrs);

    //ear-as-mouth
    SynthDef(\snd, {arg inBus = 0, rate = 60;
      var amp = Amplitude.kr(SoundIn.ar(inBus) + In.ar(inBus));
      SendReply.kr(impulse.kr(rate), '/anl', [amp]);
    }).play(~mx, [\inBus, 0], \addToTail);

    //dither-as-material, material-as-dither
    OSCdef(\lsl, {arg msg; var data = msg[3..];
      ~lvl = data[0];
    }, '/anl');

    //forms-of-trembling
    SynthDef("trm", {arg inBus = 0, outBus = 0, gate = 1, atk = 0.1, dc = 0.1,
      sus = 1, rel = 0.1, curve = 1, outAmp = 0.5, wet = 1, modFreq = 0,
      depth = 1;
      var sig, env;
      sig = In.ar(inBus, 1) * (SinOsc(modFreq).range(0,1) * depth);
      env = EnvGen.ar(Env.linen(atk, sus, rel, wet, curve), doneAction: 2);
      XOut.ar(outBus, env, sig);
    }).add;

    SynthDef("cnp", {arg inBus = 0, outBus = 0, gate = 1, atk = 0.1, sus = 1,
      rel = 0.1, curve = 1, image = 0, real = 0, outAmp = 1, wet = 1;
      var sig, env, chain;
      chain = FFT(LocalBuf(8192), 1), In.ar(inBus, 1));
      chain = PV_ConformalMap(chain, real, image);
      sig = IFFT(chain) * outAmp;
      sig = Limiter.ar(sig);
      env = EnvGen.ar(Env.linen(atk, sus, rel, wet * 0.75, curve),
        doneAction: 2);
      XOut.ar(outBus, env, sig);
    }).add;

    SynthDef("dl", {arg inBus = 0, outBus = 0, atk = 0.1, sus = 1, rel = 0.1,
      curve = 1, gate = 1, outAmp = 0.25, wet = 1, delTime = 0.1, fbk = 0.5;
      var sig, env;
      sig = SwitchDelay.ar(In.ar(inBus, 1), 1, 1, delTime, fbk, 4);
      env = EnvGen.ar(Env.linen(atk, sus, rel, wet, curve), doneAction: 2);
      XOut.ar(outBus, env, sig);
    }).add;

    SynthDef("rctcmb", {arg inBus = 0, outBus = 0, gate = 1, atk = 0.1,
```

In the Vertigo of Translations

Dario Srbic

At the first site, the five platonic solids depicted in the photograph (Fig. 01) seem, if not perfect, then at least like a faithful translation from the smooth definitions of the mathematical world into the dirty materiality of the physical world. A 3D print of a hexahedron (a cube) is recognisable as such without measuring the length of its sides or the angle between them. And what seems to be a translation from one world to the other is comprised of several hidden translations, each of them aiming to sublimate (aufheben) the previous translation while preserving (aufheben) it and cancelling (aufheben) it at the same time.¹ Such is the game of Hegelian metaphysics and

its circular motion. Identifying a hexahedron and a dodecahedron through recognition erases all differences generated in the translation process.

If the circular, deterministic movement is replaced by a stochastic one, then the path of translations does not form a perfect self-identifying circle, but a figure of a

spiral or vertigo emerges where the start of the cycle is not coincidental with the last beginning or even a previous end. The stochastic movement with the varying circumference of the circle unfolds into vertigo that may fold unto itself and, in doing so, form a shape with the geometrical qualities of Klein's bottle. It does not have an inside or outside nor up or down but is a continuous surface with only one side.

It is difficult to evoke a notion of translation without dragging along the Platonic discourse of original and copy, a deterministic hierarchy established with the primacy of the ideal model over its imperfect material actualisations in reality, mirroring the inferiority of a translation with respect to the original. This neat,

mathematically well-behaved metaphysical relationship can similarly turn vertiginous through a non-deterministic movement that gets magnified to a scale where previously negligible differences begin to matter, bringing messiness, dizziness, and instability into the picture or, in this case, a photograph.

In a metaphysical framework, the translation is a product of the difference between two identities -- the set of words used in the original work (A) and the group of words corresponding to the meaning in the initial set (B) -- where the translation function f defines connections and mappings between the two sets. Ideally, f would be bijective, where each x from A would map to exactly one y from B, forming a perfect one-to-one correspondence between the members of the sets, allowing for the lossless, repeatable, and reversible translations between the two sets. It

would also be stable, meaning that the translation function would yield the same results as the process unfolds in time. This would be the case if "aufheben" would translate to and only to "sublate", for example.

If two members of A map to one member of B, the translation loses its injective properties, which demands that no member of B can be

mapped to more than one member of A. The translation is still a function with an embedded loss since the differentiation of two members of A collapses to one member of B. Translating, sublating, preserving, and cancelling to "aufheben" collapses all the possibilities in English to one in German. In the case that one member of A can be mapped to two members of B, translation ceases to be a function, but a mere relation, in which the meaning of A is necessarily altered since one of the possibilities from B must be assigned to A with all other possibilities being lost in the work of translation. To translate "aufheben", one needs to choose depending on context abandoning all other options (unless one translates Hegel).

In conclusion to his book "Shadows of the Mind", Roger Penrose distinguishes between three worlds: mathematical emerging from mental, physical emerging from mathematical, and mental arising from physical.² If relations between the worlds were bijective (one-to-one mapping for each element in the corresponding sets), neither the direction of the movement nor the number of cycles in the move-

tion yields a different work, not only representing a previous translation but generating a new expression, a product of a previous translation with an applied transformation. The start, the direction of the movement, and the number of cycles transversed deliver different results, not repeatable in its entirety, even if all mentioned parameters stay the same. Each start (even from precisely the same point)

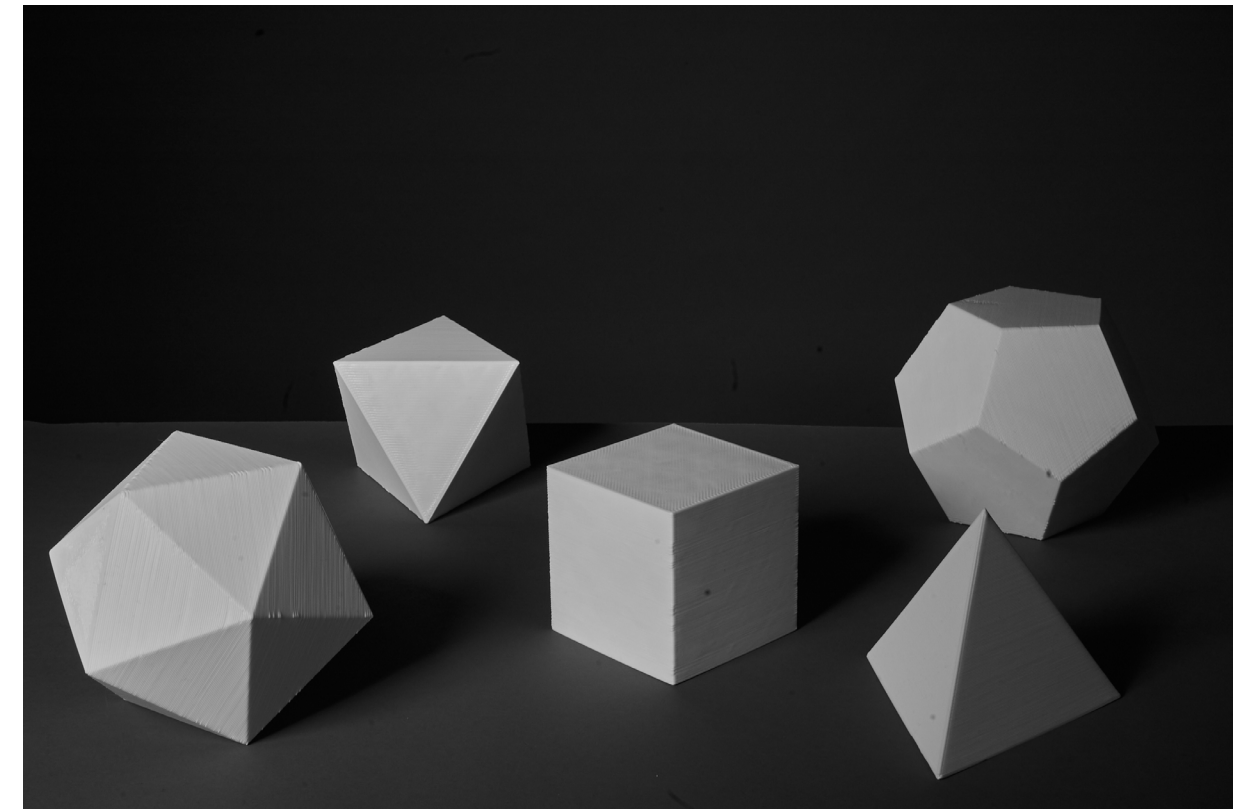


Fig. 01, Dario Srbic, "Platonic Solids", 3D print in plastic, 2022.

ment would matter at all. The move would reproduce the same circle ending exactly where the previous translation started and with the latest translation ending in the perfect reproduction of the original. Since the mappings are not bijective, each transla-

tion produces a different translation or a different copy, no matter how close the initial conditions of the translation process are. In the case of the platonic shapes above, 3D print emerges as a material, physical expression from a perfect mathematical model.

They are translated from the mathematical into the physical world with all its by-products, such as elephant feet, curling of layers and angles, filament snap, and gaps in the wall, to name a few.³

³ Sean Aranda (2022), *3D Printing Failures: How to Diagnose and Repair All Desktop 3D Printing Issues*, (Independent Publishing).

This translation consists of several inter-translations needed to transform the original model into a 3D print. Smooth NURBS expressed as parametrised mathematical functions are translated into a stereolithography model containing a series of linked triangles to describe surface geometry.⁴ In the next

⁴ NURBS are non-uniform rational B-Splines or mathematical representations of 3D geometry. See Arturo Tedeschi (1884), *AAD Algorithms-Aided Design. Parametric Strategies Using Grasshopper* (Brienza: Le Penseur Publisher), 121-122.

step, the stereolithography model is imported into a slicer, software that performs two translations. First, it translates free standing model into a printable model by generating support structures according to the physical constraints of the 3D printing process and the printer itself. Second, it translates those layers into G-code, a computer numerical-control programming language consisting of simple commands that determine the parameters

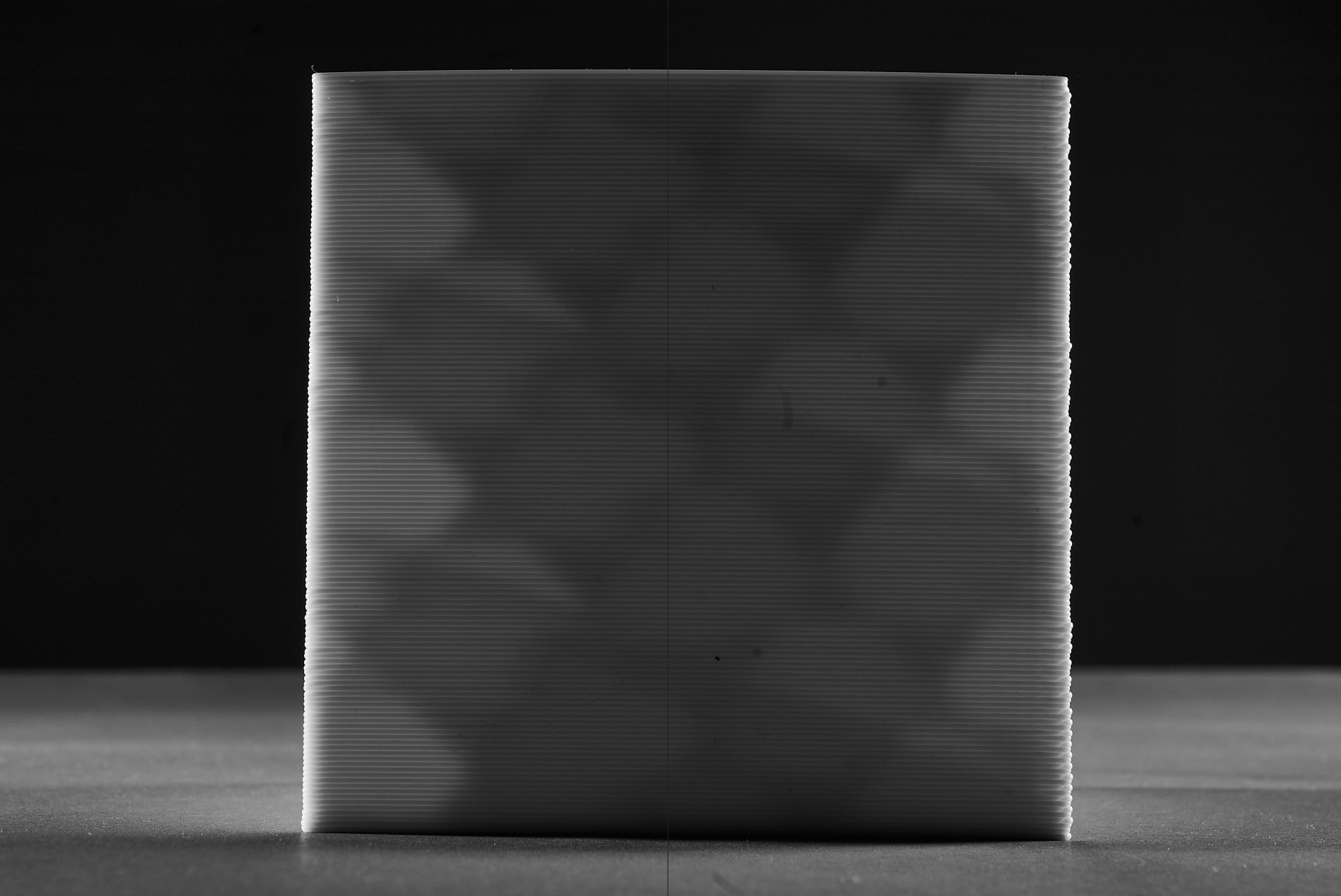


Fig. 04, Dario Srbic, "Tetrahedron, Dodecahedron, and Octahedron", 3D print in plastic, 2022.

of translation: the movement of the print head, the temperature and the amount of the material extruded.⁵ In the last

⁵ For the definition and commands of G-Code see Diego Garcia Cueva and Gianluca Pugliese (2020), *Advanced 3D Printing with Grasshopper* (Independently published), 31-38.

step, those commands are sent to a 3D printing machine, which translates them through its firmware into the physical movements of the head, heating and extrusion of the material used to create a 3D print. The perfect lines of the mathematical model are expressed as a movement of a head depositing material horizontally or a group of layers stacked on top of each other vertically (Fig. 02). Described in this way, the process still strives to preserve resemblance to the original model and the possibility of its recognition, that sets aside the imperfections of the material expression.

The loss and the inadequacy of translation relate closely to Plato's discourse on the model and the copies. In Deleuze's reading of Plato, there are two kinds of copies: copies-icons, "always well-founded" that are faithful since they are based on the resemblance to the original model, and simulacra-phantasms, "always engulfed in dissimilarity".⁶ Resemblance situates itself as a criterion

⁶ Gilles Deleuze (1990), *The Logic of Sense*, ed. Constantin V Boundas, trans. Mark Lester and Charles Stivale (New York: Columbia University Press), 256.

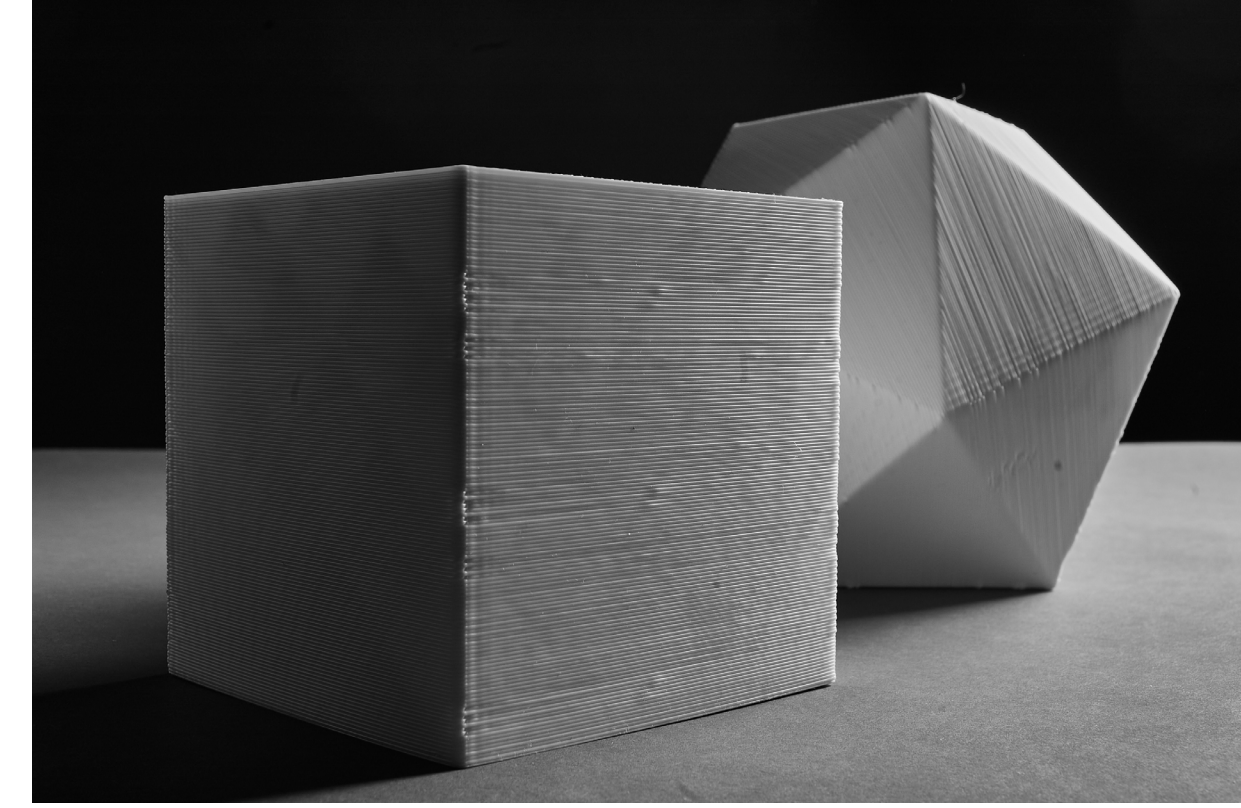


Fig. 02, Dario Srbic, "Hexahedron and coshedron", 3D print in plastic, 2022.

of difference with "the superior identity of the Idea which founds the good pretension of the copies, as it bases it on an internal or derived resemblance".⁷ Consequently, a copy of a copy without an original, a simulacrum -- the nested relation of translation -- will necessarily produce copies which are further away from the original, with each iteration deteriorating the relationship to the original. Without bijective property, the translation relation cannot be inverted and hence cannot recreate an originating model entirely from a copy.

A photograph of a hexahedron (Fig. 03), yet another translation responsible for the visible curvature at the top of the cube, reveals an indispensable element of the translation from a 3D model to a 3D print: a support structure. Hidden inside the mod-

el, it holds the sides of the hexahedron together and supports the top of it. Without this structure, the walls could significantly deform, and the top side would slump down inside the cube since the melted and extruded plastic could not cool fast enough and strive towards the bottom side, thanks to the physical conditions dictated by gravity. The support structure is not a mere by-product of translation, but its constitutive element, without which the cube could not be 3D printed at all. In the metaphysical framework, it is a necessary evil to be avoided and hidden. In the framework of constitutive difference, it is an essential expression of translation, melted with and inseparable from the outlines of the sculpture representing a hexahedron. The move away from a rigid, deterministic view of

translation as the preservation of the original is portrayed in Walter Benjamin's text "The Translator's Task", where the translation does not constitute the finding of corresponding words, thus forming a lesser copy of the original. Still, it is a new expression of the text (or a model, an image or dataset), a transformative act that reveals the untranslatability (the perfect one-to-one mapping) of the original work.⁸

⁸ Steven Rendall (1997), "The Translator's Task, Walter Benjamin (Translation)", *TTR* 10, no. 2: 151-165. doi.org/10.7202/037302ar.

With each new translation, a new meaning, interpretation, and expression is produced, which uncovers something new that was hidden in the previous translations and the original itself.

In this sense, translation is not a generic operation of mapping one language to another, decoupled from the original and simply applied to it, but a unique relationship forming from the original and the translation and informing them both. According to Benjamin, translation is properly essential to some works.⁹ Perhaps the best example of such work is W.G. Sebald's *Austerlitz*.¹⁰ While the original is written in somewhat antiqued German, Anthea Bell's translation generates an odd, fresh rhythm to the novel. At

¹⁰ W.G. Sebald (2001), *Austerlitz*, trans. Anthea Bell (London: Penguin Books).

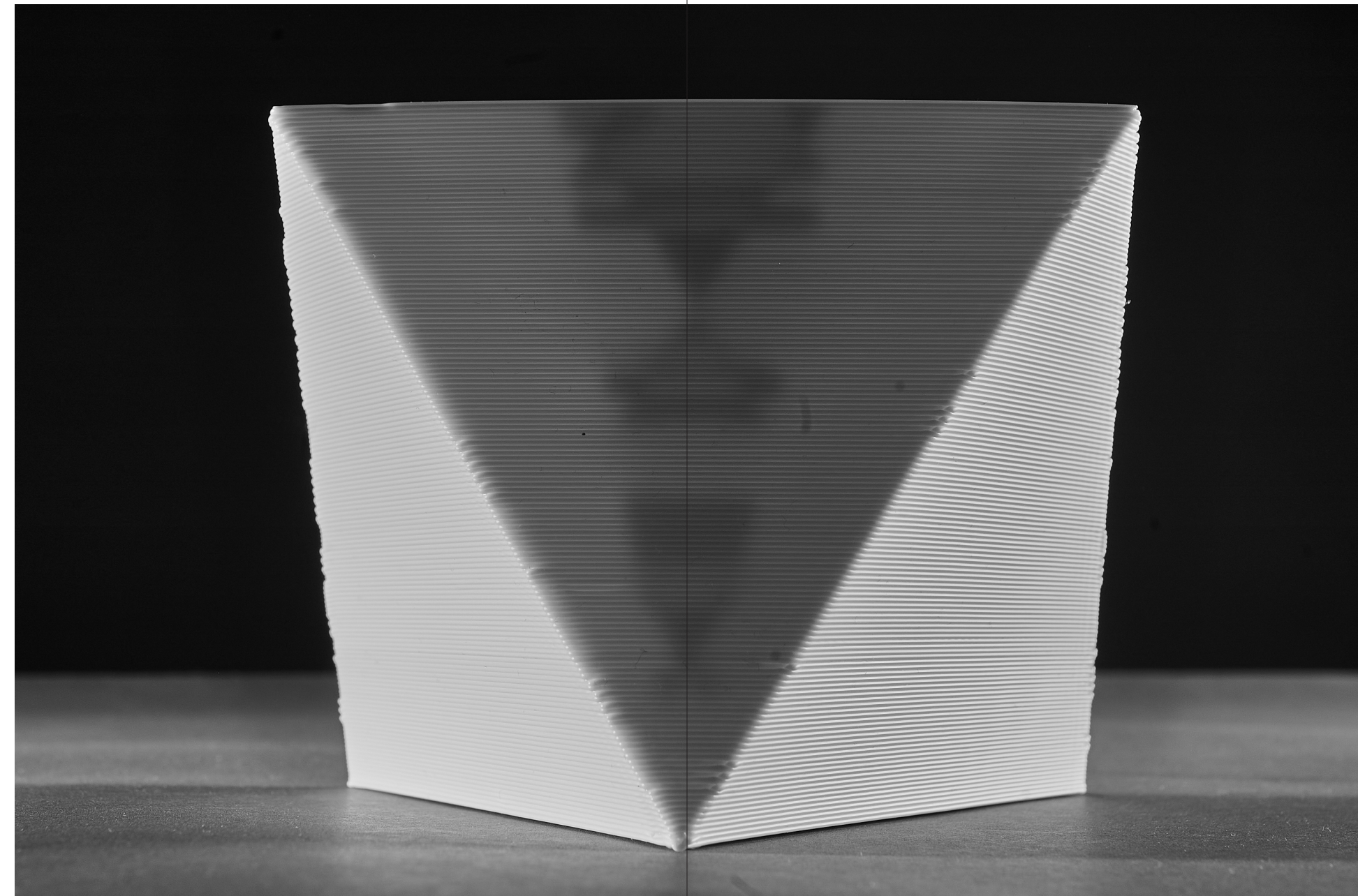


Fig. 05, Dario Srbic, "Octahedron", 3D print in plastic, 2022.

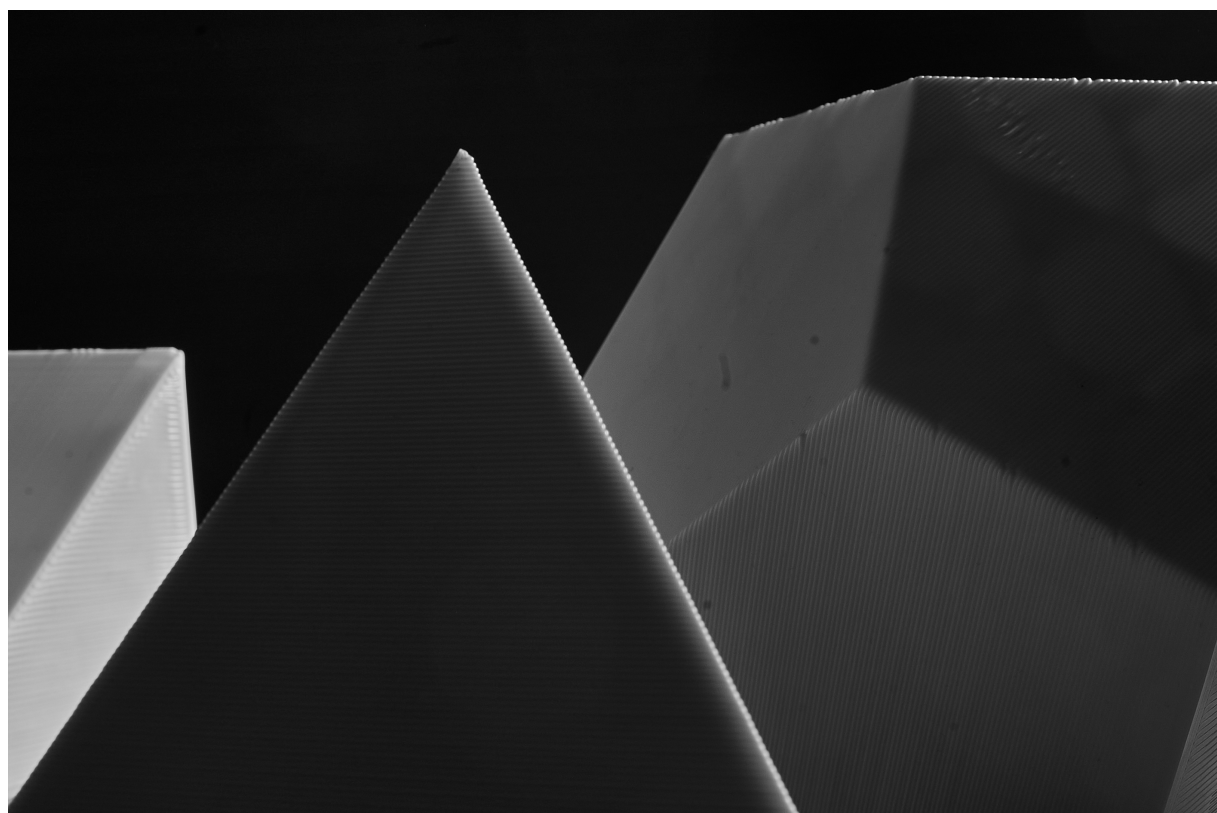
the time of the writing, Sebald was completely fluent in English and could have translated, if not even written, the work itself in English. And yet he understood that the work needed a translation not by himself but by Anthea Bell, to reach the unfolding of its expression. By writing it in German, Sebald already anticipated translation as part of the work. Translated work is not a better copy of the original, an inverse of what translation in Platonic terms means, but a break from a hierarchical order, a product of the encounter (translation) between the German and English expressions, or as Hannah Scheithauer suggests:

Bell suggests that Sebald saw failures in translation as the expression of a more fundamental break within language itself. A sense of deep-seated untranslatability, which is not limited to a text's movement between languages but relates to all forms of linguistic expression – paradoxically – emerges at the very core of what Austerlitz seeks to express.¹¹

The anticipation of translation is a constituent part of 3D modelling when the final product is intended to be

¹¹ Hannah Scheithauer (2023), "Translation and its Failures: W.G. Sebald's 'Austerlitz' and Anthea Bell at UNIQ," e-mail message to author, January 20, 2023.

Fig. 03, Dario Srbic, "Hexahedron", 3D print in plastic, 2022.



printed. An artist or designer pre-emptively avoids certain design elements known to be unprintable or incorporates them in excess to examine how the translation will fail. It is not an inversed of the copy and its twisting back to insult or threaten the original, but the reversal of the metaphysical process of hierarchisation and categorisation into an emergent process consisting of translation as an encounter from which both the work as a model and the work as a copy emerge.

While Deleuze did not spare any chance to insult or threaten metaphysics, he defines the reversal of Platonism not as a primacy of a copy over the original but as an entirely different configuration, similar to Benjamin's understanding of the translator's task in which forms are not eternal but is constantly in a state of becoming, not being pre-existing mod-

els but emerging from the interaction between the virtual and the actual:

For there is a vast difference between destroying in order to conserve and perpetuate the established order of representations, models, and copies, and destroying the models and copies in order to institute the chaos which creates, making the simulacra function and raising a phantasm – the most innocent of all destructions, the destruction of Platonism.¹²

Within this framework, 3D print can be seen as a form of simulacrum, not a mere replica of the original, but a blurring or dithering between reality and its representation, reversing the direction of translation, and varying the circumference of its movement. Its vertiginous repetition, produced by stochastic

¹² Gilles Deleuze (2004), *Difference and Repetition*, trans. Paul Patton (London: Continuum), 266.

nesting of translation, a simulacrum – not a copy without the original, but the copy with the original – emerges from the process of translation. This vertiginous movement was meticulously described in a science-fiction short story, "Pay for the Printer", by Philip K. Dick, which simultaneously critiques the rise of mass production and predicts the rise of 3D printing technology. Biltong, a benign alien species, can replicate objects and thus supply the humans who lost the ability to produce them. At first, Biltongs can produce perfect copies, but with time, the original objects deteriorate, as well as with ageing Biltongs with their ability to create exact replicas. If the original is lost, then a copy is used for replication, degrading the result even further. Copied buildings start to collapse while a copy of newspapers becomes unreadable, a jumble of meaningless words: "A vague blur of broken type, watery ink that still hadn't dried, faint, streaked and uneven."¹³

On the one hand, the description of the copy of the newspaper can be seen as a bad copy or a bad translation. Just as in the photograph of a tetrahedron, dodecahedron, and octahedron (Fig. 04), lines of deposited plastic reveal an edge that is not a straight line as deviations from the smooth NURBS of a mathematical model. On the other hand, the degraded, unreadable copy of a newspaper is the shift from discursive into figural, where the materiality of the print becomes palpable. The lines in the print are not anymore, an imperfect representation of the smooth line but an expression of the vertiginous movement of the printer head from the bottom of the tetrahedron to its apex, defining the rhythm of the process when a hand glides across it, reminiscent of the rhythm present in Bell's translation of Sebald's work.

In the last figure (Fig. 05), an octahedron rests in the middle of the picture, as its usually represented in drawings and digital renderings, laying on one of its faces, unable to float on one of its apices as it usually

does in the geometrical drawing, hiding five of its polygons, less recognisable, if at all, as an octahedron. Through the careful placement of light that hits it from the sides, a fragile, ghostly figure emerges in the middle of the picture, otherwise invisible if the angle of light hitting the object was to change. It is a shadow of the internal supporting structure that holds the octahedron together, all to gladly dismissed in the Platonic framework of resemblance and recognition, tolerated as a necessary by-product of imperfect translations, and dismissed (aufgehoben) as soon as the octahedron is identified. At the same time this shadow constitutes a marker of translation, a central element in the reconfigured framework of difference, a generative encounter of the original and translated work, of a model and the copy, outside of the static, hierarchal order. None of the apices rages above the others as a primary, apart

from the one below the shadow of translation (difference), with the other two peaks resting on a visibly curved connecting line, neither the original nor copy being a lesser version of the other, but both equally valid expressions of reality. In this constellation the idea of a static and authentic expression takes a back seat while the importance of the multiple, dynamic, and transformative nature of expression emerges in the figure of translation.

To end with a slightly different beginning, the question Jacques Derrida poses in the first sentence of the introduction to Philippe Lacoue-Labarthe's *Typography* regarding the impossibility of translation of the term without taking into account the role and the place in the whole of Lacoue-Labarthe's work can be paraphrased from: "How are they going to translate *désister?*" into: how are they going to translate a shadow?¹⁴

¹⁴ Philippe Lacoue-Labarthe (1998), *Typographie: Mimesis, Philosophie, Politics*, ed. Christopher Fynsk (Stanford: Stanford University Press), 1.

```

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sig = IFFT(chain) * outAmp;
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GRASPING THE LIQUID

ABSTRACT/EXTRACT

Jannis Neumann

In comparative examinations of the process of gelation and the way in which essentialist biases are influencing scientific research, various analogies can be observed. The research focuses largely on gelatine, a gelling agent that derives from collagen, which is abundantly present in the human body. Secondly, it engages with sexual orientation, which is regularly studied with the purpose of identifying biological determinants of nonheterosexual behaviour as examined with a study by Ganna et al. (2019). Key aspects that were found to overlap between both phenomena are (A) the extraction of a single component out of a larger context, (B) this component's application to solidify a liquid state into firm matter, (C) the large influence of external forces – which are characterised in the study as the *mould* – on the formation of the hydrogel/research data, and (D) the sensational way they are presented to a wider audience. Finally, the high risk of (E) how a false attribution between a body's translucency and a clear understanding can possibly tilt into eugenic thinking is examined alongside various counterstrategies such as bum-shaking.

¹ Garland Allen (2005), "Mechanism, vitalism and organicism in late nineteenth and twentieth-century biology: the importance of historical context", *Mechanisms in Biology*, 36: 2, 269.

² S LeVay (1991), "A difference in hypothalamic structure between heterosexual and homosexual men", in *Science*, 253(5023), 1034–1037.

³ Dean Hamer, et al (1993), "A linkage between DNA markers on the X chromosome and male sexual orientation," in *Science*, 261(5119), 321–327.

⁴ R.Blanchard and Klassen (1997), "H-Y antigen and homosexuality in men", in *Journal of theoretical biology*, 185(3), 373–378.

⁵ Michel Foucault (1983), *Der Wille zum Wissen: Sexualität und Wahrheit 1*, Frankfurt am Main: Suhrkamp, 47–48.

⁶ Andrea Ganna et al (2021), "Large-scale GWAS reveals insights into the genetic architecture of same-sex sexual behavior" *Science*, 365(6456), eaat7693, 1.

⁷ Robert H. Bogue (1923), "Conditions Affecting the Hydrolysis of Collagen to Gelatin," in *Industrial and Engineering Chemistry*, 15 (11), 1154.

⁸ GME Gelatine Manufacturers of Europe (2022), "Manufacturing: Premium raw materials and state-of-the-art industrial facilities deliver a pure, high-grade protein" at [gelatine.org/en/gelatine/manufacturing.html](https://www.gelatine.org/en/gelatine/manufacturing.html)

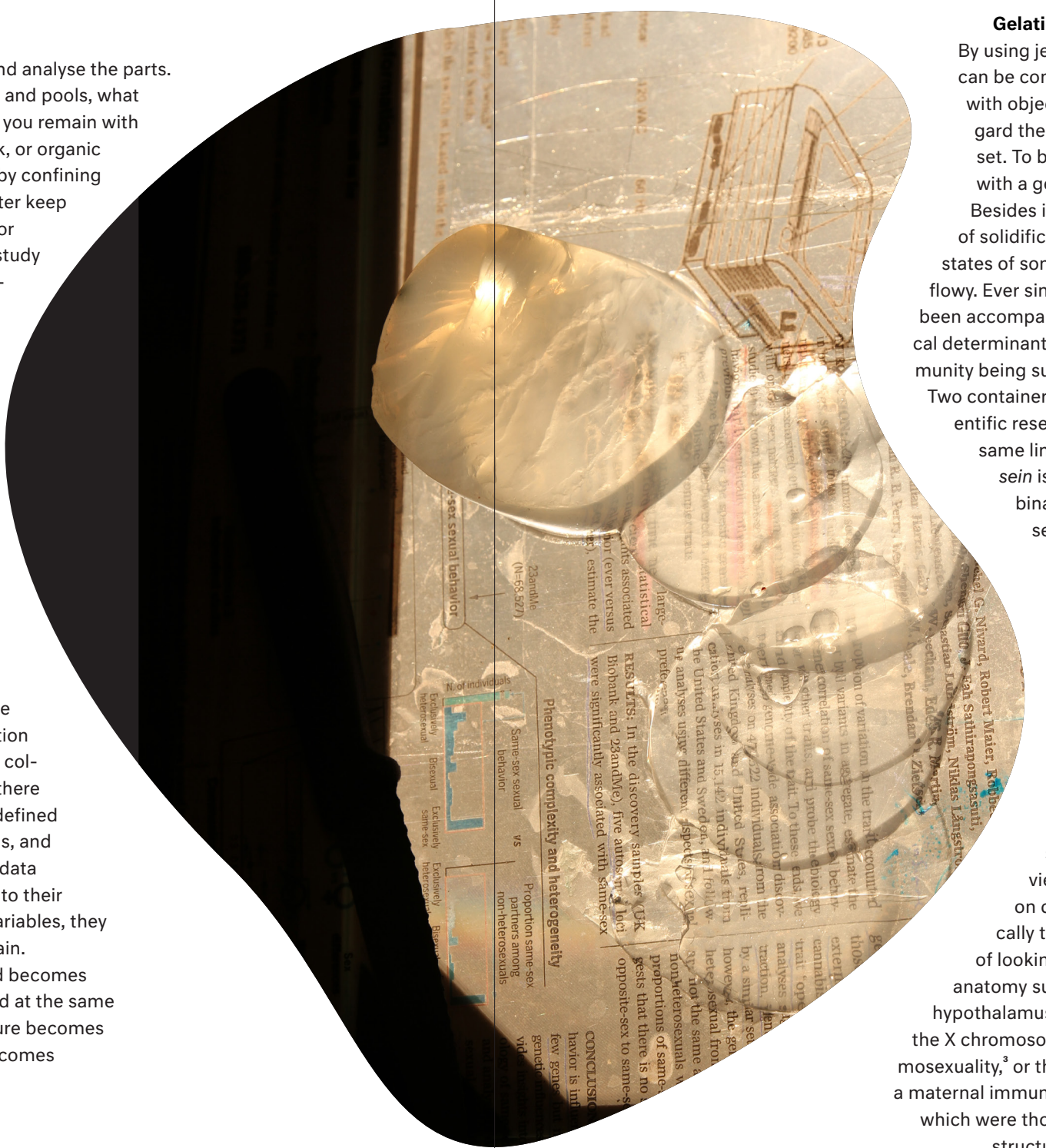
⁹ Khalesi, Hoda et al., "Fundamentals of composites containing fibrous materials and hydrogels: A review on design and development for food applications", *Food Chemistry*, 364 (2021) p1-2.

¹⁰ Cao, Yiping and Mezzenga, Raffaele, "Design Principles in food gels", *Nature Food*, 1 (2008), p108.

Solidifying a liquid

If you want to understand the sea, you cannot simply dissect it and analyse the parts. When you fill it into a bunch of containers and canisters, buckets, and pools, what you remain with cannot be called an open water anymore. Rather you remain with little portions of extracted water, maybe with residue of sand, rock, or organic material – materials which once before defined what the sea was by confining it, yet simultaneously belonging to it. These small quantities of water keep certain qualities of their formerly state such as being liquid or wet or consisting of hydrogen and oxygen molecules, but even if you will study them for a long time there will be no chance, that you get an understanding of the sea, but only of the notion of seawater in a bucket. Generally, humans tend to be rather dissatisfied when something slips their full understanding. When trying to grasp water, you can form a bowl with both of your hands by pressing your fingers together tightly, so when you draw some of the liquid from a bucket, nothing is running through your fingers. The water appears even as steady in the hands. However, when giving up this particular shape, it will start to flow again, taking on a new form by following gravity. Besides using your body or another container to enforce a somehow stable state onto the liquid externally, a gelling agent can be added to solidify the liquid from within. After the liquid has gelled in a vessel, it can be removed from it, while keeping its shape. The gelling agent forms a gel, the container provides the material with a form and the gel becomes a container, contained in itself. Especially in statistical analyses of data sets, similarities between the process of gelation and the scientific process of knowledge production can be observed. To perform such an analysis, the data needs to be collected in the first place, as by no means it exists naturally. Initially, there is only a liquid phase consisting of a vast number of more or less defined entities that exhibit different characteristics, behaviours, relations, and relationships towards each other. To make them accessible for data processing, scientists take these phenomena, attribute them to their research objects and operationalise them into particular variables, they seek to observe, measure, and ultimately, want to explain.

No more flowing through your fingers – the liquid becomes tangible, easier to grasp, wobbly and solid at the same time. The external support structure becomes obsolete, as the external becomes internalised.



Gelation in scientific research

By using jellification, solid data is received, and statistical analyses can be conducted, whereby the data's firm qualities are associated with objectivity, reliability and truth. These considerations often disregard the cast form, in which the initially unprocessed information has set. To become scientifically proven, the fluid phenomenon is mingled with a gelling agent, and ultimately consolidates into a hard fact. Besides its usefulness in making sense of the world, the common practice of solidification also entails serious dangers of producing rigid and brittle states of something that virtually constitutes itself by being dynamic and flowy. Ever since its emergence in the 19th century, the term homosexuality has been accompanied by ongoing scientific research obsessed with finding biological determinants for sexual orientation – alongside people from the queer community being subjected to gross human rights violations and atrocities. Two containers in which the jelly sets, two terms, which already preceded scientific research as a part of everyday understanding by operating with the same linguistic categorisation systems. The expression *vom anderen Ufer sein* is a phrase in the German language, which illustrates the common binary thinking by envisioning categories such as sex, gender and sexual orientation. It describes being gay literally as being from the other shore, and therefore draws on the traditional dichotomy of hetero- and homosexuality. It declares two locations, here and there: Here as the norm and as the standard, and There as the other place, in which someone cannot simply be, but needs to have moved to at one point in time – the heteros are, the homos become.

Throughout the last century, quite a lot of advocates of biological essentialism intended to uncover what appeared as a white spot in their understandings of sexuality. Their reductionist approach follows the top-down view of mechanistic materialism, as the scientific analysis relies on dissecting the parts of a system, in this case by trying to physically take sexual desire apart, to the lowest level of organisation, instead of looking at it as a whole.¹ Findings were made that centred around brain anatomy such as a decreased volume in the interstitial nucleus of the anterior hypothalamus (INAH),² the gene Xq28, a subtelomeric region on the long arm of the X chromosome, which was concluded as a maternal transmission of male homosexuality,³ or the fraternal birth order, when proposing that a male fetus induces a maternal immune reaction of antibodies towards subsequent male fetuses, which were thought to interfere in the development of sex-dimorphic brain structures of male fetuses in subsequent pregnancies.⁴



The striving for understanding sexual behaviour through measuring the body only became viable when the sexual act carried out between two (or more) people was transformed into the personality of the homosexual. An identity equipped with its own specific history, characteristics, morphology, and anatomy, or as Foucault expresses it: Homosexuality became a species in its own right.⁵ By locating sexual orientation not only within a person, but also within their very corporeality, it paved the way for scientific examinations of the queer body. Only in 2019, an article titled *Large-scale GWAS reveals insights into the genetic architecture of same-sex sexual behavior* was published in *Science* by Ganna et al., in which the research group identified five loci on the human genome that show a statistical significance in the association with same-sex sexual behaviour. To do so, the data of about half a million probands was pressed into the two moulds of a never-vs.-ever-have-I-had-sex-with-someone-of-the-same-sex binary, regardless of being collected in much more nuanced ranks and ratios beforehand. Also, to make their method feasible, every person, that identified themselves not as cisgender male or female, was cut away from the research.⁶ Once flowy, sparkly, and effervescent, sexual orientation becomes a firm matter, sliceable and purified through queer complexities, and the processing of the extracted DNA information forces it into a translucent state. Mistaken as sound knowledge or even abused in homophobic ideology, such research will be threatening the queer body's very matter in its further existence by bioinformatic fortune telling.



Jelly bodies

With their wobbly behaviour and soft texture most jellies already seem to be bodily related to our own corporeality on a phenomenological level. When looking into the origin of gelatine, the familiarity becomes even more evident. Our human bodies literally consist of a great amount of jelly substance, a large piece of aspic walking the world on two legs. And whenever we eat some, it will be digested and absorbed, only to become part of ourselves. Shaking your bum is like shaking a jelly, whereby the trapped juices keep them jiggly. The extracted substance becomes a material abbreviation of the human body yet hydrolysed and highly purified.

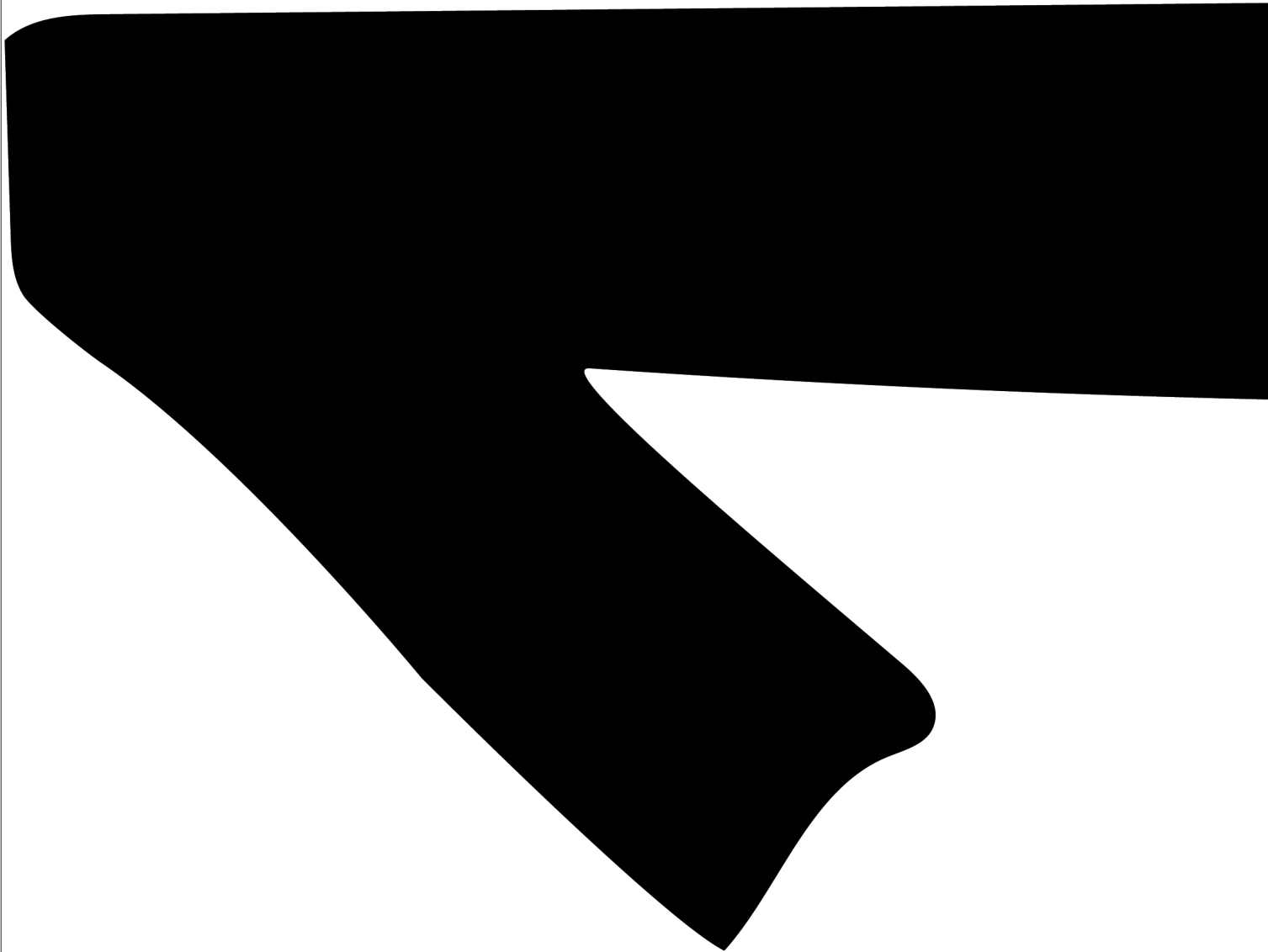
Gelatine is originally obtained in a lengthy process by boiling cow bones, isinglass or pig feet over a longer period of time. During the heat intense procedure, the contained collagen proteins exude and undergo a chemical reaction, in which its polymer strands hydrolyse irreversibly and transform into gelatine.⁸ Within the extracellular matrix of mammals and other vertebrates, the collagen reinforces various dermal and connective tissues. Besides skin, also cartilage, bones, tendons and ligaments are enabled to hold together firmly as well as to stretch in multiple directions simultaneously due to its enhancement. The protein is organised as repeating sequences of amino acids, which form left-handed strands and join into a triple helix. This configuration allows for an enormous elongation of the spiralled molecule without rupturing easily. While prolonging, the large amount of retained water within the extracellular matrix gets compressed and flows through the collagen network, which provides the tissue with a high flexibility.⁹ When extracted from the animal body, the triple helices get disconnected and dissolve as single strands in water-based liquids, before they reconnect to each other and form large gel-networks when getting heated up.¹⁰



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rel = 0.11, curve = 1, sus = 1, outAmp = 1, wet = 1;
var sig, env;
sig = PitchShift.ar(In.ar(inBus, 1), 0.3,
(freq.cpsmidi - 60).midiratio, pitchDisp, timeDisp);
sig = sig * outAmp;
env = EnvGen.ar(Env.linen(atk, sus, rel, wet, curve), doneAction: 2);
XOut.ar(outBus, env, sig);
}).add;

SynthDef("rsn", {arg inBus = 0, outBus = 0, freq = 500, bwr = 3, gate = 1,
atk = 0.1, dec = 0.1, rel = 0.1, curve = 1, sus = 1, outAmp = 1, wet = 1;
var sig, env;
sig = Resonz.ar(In.ar(inBus, 1), freq, bwr);
sig = sig * outAmp;
env = EnvGen.ar(Env.linen(atk, sus, rel, wet, curve), doneAction: 2);
XOut.ar(outBus, env, sig);
}).add;

SynthDef("phsr", {arg inBus = 0, outBus = 0, freq = 1000, res = 0,
gate = 1, atk = 0.1, dec = 0.1, sus = 1, rel = 0.1, curve = 1,
outAmp = 1, wet = 1;
var sig, sig2, env, mixed;
sig = In.ar(inBus, 1);
sig2 =
AllpassC.ar(AllpassC.ar(AllpassC.ar(
AllpassC.ar(AllpassC.ar(sig, 0.10, freq.reciprocal, res), 0.10, freq.reciprocal, res), 0.10,
freq.reciprocal, res), 0.10, freq.reciprocal, res), 0.10, freq.reciprocal, res), 0.10,
freq.reciprocal, res);
mixed = sig + sig2 * outAmp;
env = EnvGen.ar(Env.linen(atk, sus, rel, wet, curve), doneAction: 2);
XOut.ar(outBus, env, mixed);
}).add;

SynthDef("chrs", {arg inBus = 0, outBus = 0, modRate = 0.001,
maxDelay = 0.05, minDelay = 0.01, gate = 1, atk = 0.1, dec = 0.1,
sus = 1, rel = 0.1, curve = 1, dry = 0, wet = 1, amp = 1;
var sig, env, lfos, chorus;
sig = In.ar(inBus, 1) * 8.reciprocal;
lfos = Array.fill(8, {SinOsc.ar(modRate * rrand(0.95, 1.05),
rrand(0.0, 1.0), (maxDelay * 0.5) - minDelay,
(maxDelay * 0.5) + minDelay)});
chorus = DelayC.ar(sig, maxDelay, lfos);
chorus = Mix.ar(chorus);
sig = (dry * sig) + (wet * chorus);
env = EnvGen.ar(Env.linen(atk, sus, rel, wet, curve), doneAction: 2);
XOut.ar(outBus, env, sig);
}).add;
```

Darkroom Frottage : The Ecstatic Sacred

My practice-led research is concerned with rethinking the material knowledge of production and mattering of the photograph. We look at the full sense of the darkroom as a particular kind of encounter: both a photographic and erotic emergence of its material attributes and the logic of sense.

The project focuses on corporeality, gestures, movements, rhythms, and tacit knowledge.

Creating within and of the dark, in what I am naming as Theo-erotics, this method privileges the sensual material and tangible attributes of production and the non-visual aspects of photography rather than an overdetermination of representation.



Black boy on the Verge of Suckling Fish Christ, 2020



Heels and Stockings, 2021



Bud Kim, 2018



Mark and Seyon, 2021



Seyon Amosu, Muse, 2020

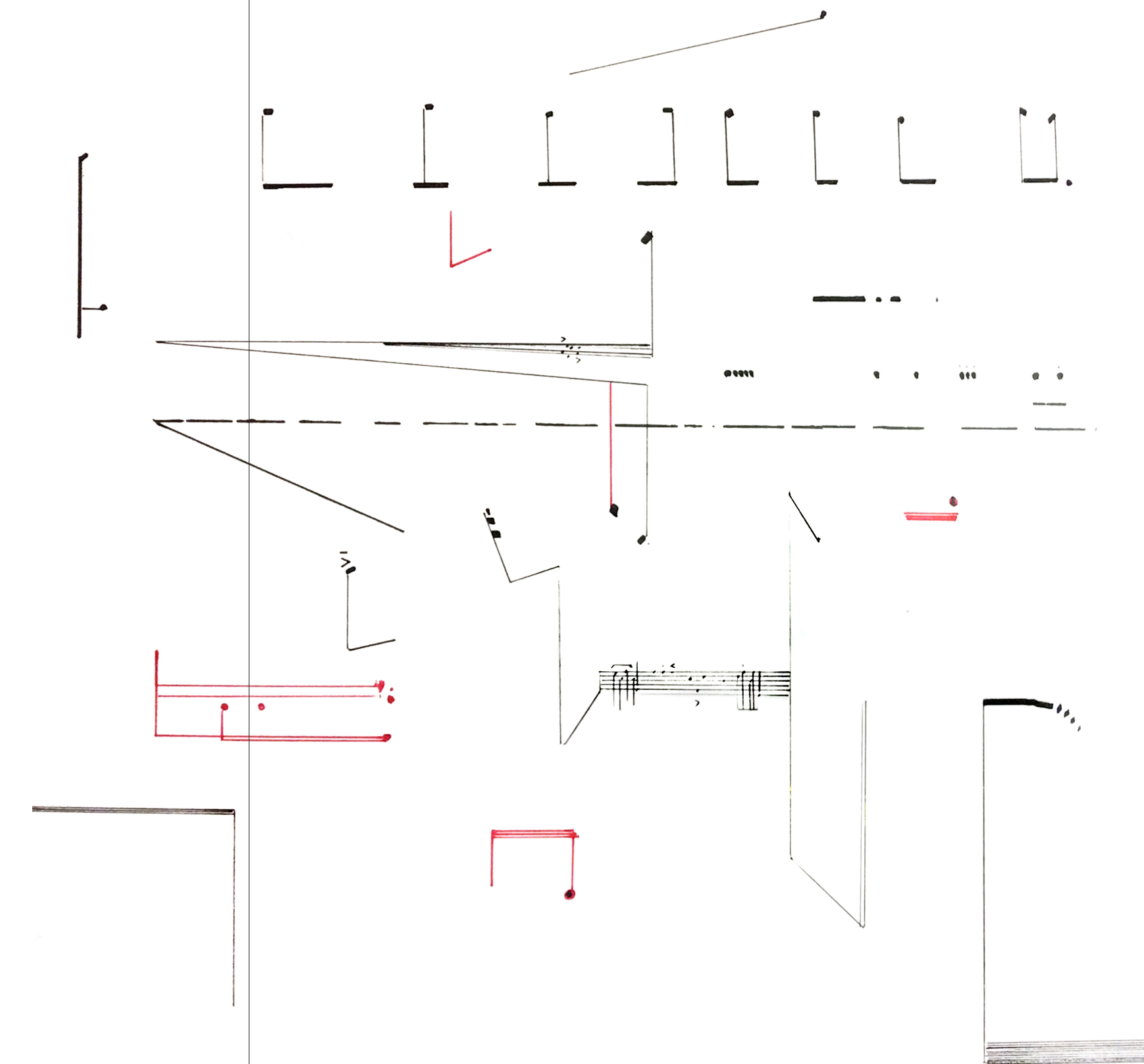


Seyon Amosu, Muse, 2020

Sisssckaaahhh

Matt Lewis

Sisssckaaahhh is a single iteration of an ongoing project of music-machine-human collaboration, following a musical loop between musicians, our collective listening imagination and machines. In this project, the results of machine-generated, AI-driven graphic scores are used as the basis to retrain the musician, not the machine. This reversing of the commonly conceived machine learning process follows a long historical and cross-cultural set of traditions of such musical interactions between our tools and the possibilities of the performed acoustic world. The score presented represents just one attempt to manually reinterpret the errors and possibilities offered by a machine and offers you the opportunity of collective musical response.



What Emerges From Silencing

Manu Luksch

*How can I tell you about the people of Omelas? They were not naive and happy children – though their children were, in fact, happy. They were mature, intelligent, passionate adults whose lives were not wretched. O miracle!*¹

Ursula K. Le Guin,
'The Ones who Walk Away from Omelas'

How can smart governance be implemented on an urban scale to optimise the reciprocal effects of technology and society on each other? A key event where industry leaders and city administrators meet to discuss such issues, on and off stage, is the annual Smart City World Expo in Barcelona. 'Smart Dubai' features prominently, a pioneer in the field. I attend a talk by its Director General, Dr Aisha Bint Butti Bin Bishr: 'Today our core principle guiding Smart Dubai is efficient, seamless, safe and impeccable experience for both residents and visitors. Why do we implement all these technologies? In order to attract talent, and foreign investment [...]. This is the office that will oversee the digital transformation of the city. It is also part of our role to ensure that all the experiences and all the services around the city are catering to provide Happiness.'²

¹ Ursula K. Le Guin (1978), 'The Ones who Walk Away from Omelas', in: *The Wind's Twelve Quarters* Vol. 2, (Granada Publishing), 115.

Intrigued by Bin Bishr's claim to have harnessed technology to engineer happiness, I travel to Dubai, the most populous city in the United Arab Emirates, on reconnaissance. A palace of superlatives saturated with eternal sunshine and abundant wealth; host to the world's tallest building, the longest indoor ski slope, horse races with lavish prize funds; boasting unmatched retail and recreation opportunities and even a Ministry of Happiness. Could this be miraculous Omelas?

Nine million expatriates, comprising about 90% of the population, drive the UAE's construction, technology and service sectors. Among them is Artur Ligęska, an innovator of fitness culture. Following a business collapse in 2017, he leaves Poland for Dubai, attracted by a lucrative position as personal trainer and consultant. 'In the first six months, I really had a royal life, I was so happy. I trained people in high management from Dubai and also members of the royal family in Abu Dhabi.'³

*Joyous! How is one to tell about joy? How describe the citizens of Omelas?*⁴

² Dr Aisha Bint Butti Bin Bishr, panel discussion at Smart City World Expo, Barcelona 2015.

³ Artur Ligęska in Manu Luksch (2022), *Sing and Cry, Cry and Sing*, (sixpackfilm), DCP 2K.

⁴ Le Guin, *The Ones who Walk Away from Omelas*, 114.

At the Smart Dubai offices, Dr Bin Bishr explains how contentment is cultivated: 'Happiness was the vision by our Sheikh for our people, be it the residents or visitors. This was always at the heart of our vision for Smart Dubai. We launched the Happiness-meter two years ago to measure the experience of people when they interact with the city. Different contact points are services by the government or private companies, such as hotels or restaurants. You can signal if

you are happy or not. And this will provide visibility to us city managers of how people are interacting with the city – are they happy or not? So, each city manager has their own dashboard measuring the services they are responsible for providing. It's something like a heat map - you know, yellow, green, orange, red. If there is an unhappy experience, they can drill down and see why people are unhappy about it.'⁵

The following day, I have the opportunity to speak to Emirati engineer and poet Ahmed Mansoor about a local user's perspective. 'The impact of a smart city kind of arrangement in a democratic country is different than its impact in a non-democratic country. We would suffer a lot more. Like anywhere else in the world, an individual in the UAE cares about privacy, but, especially if you are involved in political activities or human rights activities, you will have to be extremely cautious about what you carry with you. Your smartphone is not a smartphone anymore, it's a tracking device, basically.'⁶

Mansoor was born in a small village in the northern Emirate of Ras al-Khaimah. Having completed his studies in the USA with a Master's degree in Telecommunications, he returns home to contribute to the development of the UAE, initially working at a satellite telecoms company. Alongside his technical knowledge, he develops an acute insight into constitutional and political issues. During the period that later became known as the Arab Spring, he co-hosts an online discussion platform to facilitate debate about public values in the UAE. In 1971, newly independent from the British, the founders of the UAE stated in the preface of the constitution that they would lead the country towards full parliamentary representation. Forty years later

⁵ Ahmed Mansoor and Manu Luksch (2017), 'The last human rights defender in the United Arab Emirates—An interview with Ahmed Mansoor,' in *Surveillance & Society* 15(3/4): 602. library.queensu.ca/ojs/index.php/surveillance-and-society/index

and with still no development in this matter, a group of intellectuals including Mansoor submit the 3rd of March Petition, which 'was directed to the president and the other six rulers of the UAE, urging them to make constitutional change to allow the members of the Federal National Council to be elected by means of universal suffrage [...], and to give this parliament full legislative and regulatory power.'⁷

The Petition authors and signatories face harsh consequences, including a wide-ranging state-sponsored media smear campaign, arrest and detention, and extrajudicial financial and physical harassment. After eight months in prison, Mansoor is pardoned and released. He begins to dedicate his efforts to helping the families of others who have been arbitrarily detained. His activities championing human rights at significant personal risk begin to draw international acclaim, and earn him the Martin Ennals Award in 2015.

*Do you believe? Do you accept the festival, the city, the joy? No? Then let me describe one more thing.*⁸

Lasse Skou Andersen, investigative journalist at *Dagbladet Information*, is highly amused: Italian spyware company Hacking Team has been hacked. He is less thrilled to discover in the leaked files that the Danish police were among its clients – as were several dictatorships that targeted their own citizens to control dissent. He's convinced that the private surveillance industry requires fundamental regulation. 'Especially here in Europe, where we have the Charter of Human Rights, and where it is of importance to protect privacy, democracy, rule of law, ... well, if we think these values are so important, is it right to sell equipment to dictators so they can deny their own people similar rights?'

⁶ Le Guin, 'The Ones who Walk Away from Omelas', 117.

⁷ Lasse Skou Andersen (2021), interview with the author, Copenhagen, Nov 2021.

Three years earlier, Ahmed Mansoor had been targeted by Hacking Team's Remote Control System spyware via a malicious email attachment. Anderson reaches out to Mansoor for a comment. Communication between Hacking Team and ETI, a Danish company subsequently bought by British arms giant BAE Systems, also catches the journalist's attention. ETI offered its services to facilitate a sale to Saudi Arabia. Did this sale go through? Who else were they selling to? What kind of equipment, what was it capable of? What would the clients use it for? And how could he find out?

Export of any dual use technology requires a licence. 'If they have to apply for a license, there has to be a paper trail, and we can try to get this paper trail through Freedom of Information requests', Andersen explains while opening up documents on his computer. 'They must deny a licence if there is a clear risk of violation of human rights.'⁹

But after 15 months of fruitless exchanges, all the Danish government had provided were heavily redacted documents. On screen, Andersen brings up the licence issued to BAE Systems for the export of an internet surveillance kit to... 'Which country was buying it? Of course, this was the most interesting piece of information, but the authorities had redacted it with a big black marker.' Frustrated by the level of government secrecy, Andersen shows the documents to his partner. But her computer monitor is brighter, and the redacted words become legible. 'You could see it was for the UAE, for the Ministry of Interior. There it was, they had fucked up. And we got the information by accident!'

How could the Danish authorities have issued a licence, how could they think that there was no risk of human rights violations? At the time of the sale, it was public knowledge that the UAE had used technologies from Hacking Team to track a human rights defender – Ahmed Mansoor.

A company from North Jutland has received permission from the Danish authorities to export internet surveillance to the United Arab Emirates. Experts, Amnesty and a well-known activist from the country fear that the system will be used against critics of the regime. 'People in the West may think that "national security and serious crimes" must cover up crimes that really threaten the security of the state, such as a military coup or a terrorist attack,' says Ahmed Mansoor, referring to the wording of the documents from the Danish Business Authority. 'But in reality, those terms in the Emirates and elsewhere in the region are primarily used to describe thought crimes such as sending a tweet that criticizes the political system, or expressing an attitude that is inconsistent with that of the government.'¹⁰ (*Dagbladet Information*, 26 August 2015)

*In a basement under one of the beautiful public buildings of Omelas, or perhaps in the cellar of one of its spacious private homes, there is a room. It has one locked door, and no window.*¹¹

In March 2017, Mansoor is rearrested on trumped-up charges of 'promoting false and shaded information online' and 'serving agendas aimed at spreading hatred and sectarianism'. On May 28th, he is sentenced to 10 years' imprisonment in the notorious Al-Sadr maximum security facility, Abu Dhabi. He is held in solitary confinement, deprived of any contact with individuals inside or outside the prison; without access to educational, vocational, or rehabilitative programs; denied a mattress to sleep on, his reading glasses, clothes other than a single ripped shirt.

Ursula K. Le Guin's short story 'The Ones who Walk Away from Omelas' describes a utopia where the happiness of the population is predicated on the misery of a single child imprisoned in a windowless room. In Le Guin's psychomyth realised, Mansoor

⁸ Le Guin, 'The Ones who Walk Away from Omelas', 117.

in the place of the scapegoat, and Artur Ligęska the last person outside the UAE to have witnessed his plight. I travel to Warsaw to meet Ligęska, who relates the traumatic circumstances of his encounter with Mansoor. Somewhere, an ad promoting Smart Dubai's data-driven Happiness index plays to a beguiled audience.'¹²

Ligęska tells me how, within months of arriving in Dubai, his life takes another turn. Increasingly disturbed by the advances of a minor royal, he decides to return to Europe – but is stopped at the airport and arrested on spurious charges, and thrown into the darkest depths of the Emirati penal system. The situation becomes even more perilous when he is transferred to an isolation cell in Al-Sadr. 'They gave me one blanket, and they told me, "Welcome to Hell."¹³

As Ligęska fights for survival in the barbaric conditions, even enduring violent assault, a kind voice from a neighbouring cell reaches out to him. It is Ahmed Mansoor. The two strike up a friendship through concrete walls. Mansoor helps Ligęska cope with Christmas in isolation by sharing songs and tears, family memories, seeds of hope. Later, when Mansoor needs help, Ligęska does not hesitate to make a surreptitious call on his behalf, despite the great risk to his life.

*They all know it is there, all the people of Omelas. Some of them have come to see it, others are content merely to know it is there. They all know that it has to be there.*¹⁴

¹² Ligęska in Luksch, *Sing and Cry, Cry and Sing*.

¹³ Le Guin, 'The Ones who Walk Away from Omelas', 118.

¹⁴ Le Guin, 'The Ones who Walk Away from Omelas', 120.

Although Mansoor is in a prison thousands of miles away, the UAE's growing presence in the UK constantly reminds me of his situation. Emirati investment and sponsorship dominates sports, culture, and vital infrastructure. London boasts the Emirates Stadium and the Emirates Air Line (now rebranded the IFS Cloud) Cable Car. Gatwick Airport and Great Ormond Street Children's Hospital have received money from Abu Dhabi, and Dubai-based DP World spent over £1.5 bn building London Gateway, a port and logistics centre. The Panama files exposed the extensive London-based property portfolio of the Al Nahyans. Abu Dhabi's deputy Prime Minister, Sheikh Mansour bin Zayed Al Nahyan, owns Manchester City Football Club, and has vast investments in a regeneration scheme. But the people of Manchester have begun to realise that these deals are not in their interests. 'If there is an unhappy experience, they can drill down and see why people are unhappy about it.' – which is exactly what the independent report Manchester Off-shored does. It exposes how the city's redevelopment in partnership with Emirati, Jersey-based entities is only exacerbating the housing crisis, increases lack of transparency, fails to generate benefit for the city's social housing programme (be it in form of affordable housing units, rent or tax), and ultimately raises questions on human rights grounds about the ethical implications.'¹⁵

After a tough period of rehabilitation, Artur Ligęska moves to the Netherlands. As he continues to speak out in support of Mansoor, he is troubled by suspicious events. In May 2021, just before he is to visit me in London to complete work for the film project, I learn of his death in Amsterdam, under unclear circumstances.

¹⁵ Richard Goulding, Adam Leaver and Jonathan Silver (2022), *Manchester Off-shored. A Public Interest Report on the Manchester Life Partnership* (Sheffield: University of Sheffield).

¹⁶ Le Guin, 'The Ones who Walk Away from Omelas', 120.

*They leave Omelas, they walk ahead into the darkness, and they do not come back. The place they go towards is a place even less imaginable to most of us than the city of happiness. I cannot describe it at all. It is possible that it does not exist. But they seem to know where they are going, the ones who walk away from Omelas.*¹⁷

¹⁷ Le Guin, 'The Ones who Walk Away from Omelas', 120.

Fig. 01
Dr Aisha Bint Butti Bin Bishr, film footage by author,
Smart City World Expo 2015, Barcelona, 2015



Fig. 02
Ski Dubai, Mall of the Emirates. Film still by author.
May 2016

Fig. 03
Smart Dubai office., Film still by author.
May 2016



Fig. 04
Video still from the Smart Dubai campaign 'One of the best things data can tell us is how happy you are'. Retrieved 3 February 2023
[youtube.com/watch?v=eq62tA_UhcE](https://www.youtube.com/watch?v=eq62tA_UhcE)

Fig. 05
Ahmed Mansoor, Film still by author.
Dubai, May 2016

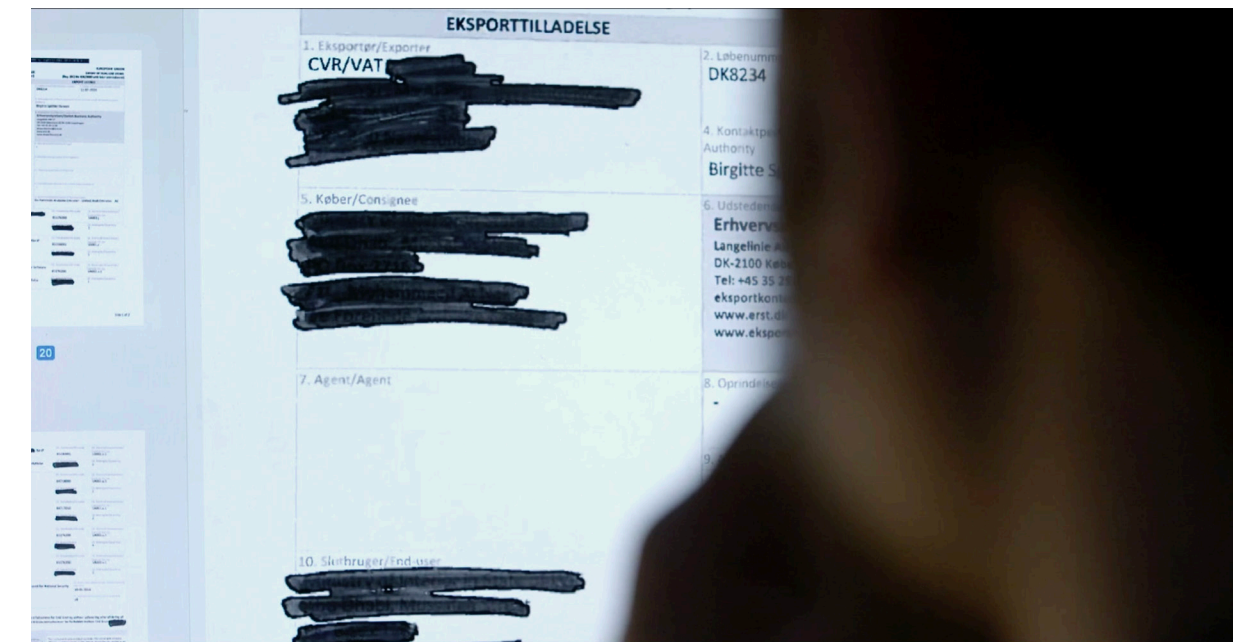


Fig. 06
Hacking the hackers, redacting the redactors:
Lasse Skou Andersen with redacted documents.
Film still from the author. Copenhagen, Nov 2021

Fig. 07
Danish company sells internet surveillance to oil dictatorship. A company from North Jutland has received permission from the Danish authorities to export internet surveillance to the United Arab Emirates. Experts, Amnesty International and a well-known activist from the country fear that the system will be used against critics of the regime. 'People in the West may think that "national security and serious crimes" must cover up crimes that really threaten the security of the state, such as a military coup or a terrorist attack,' says Ahmed Mansoor, referring to the wording of the documents from the Danish Business Authority. 'But in reality, those terms in the Emirates and elsewhere in the region are primarily used to describe thought crimes such as sending a tweet that criticizes the political system, or expressing an attitude that is inconsistent with that of the government.' (Dagbladet Information, 26 August 2015)

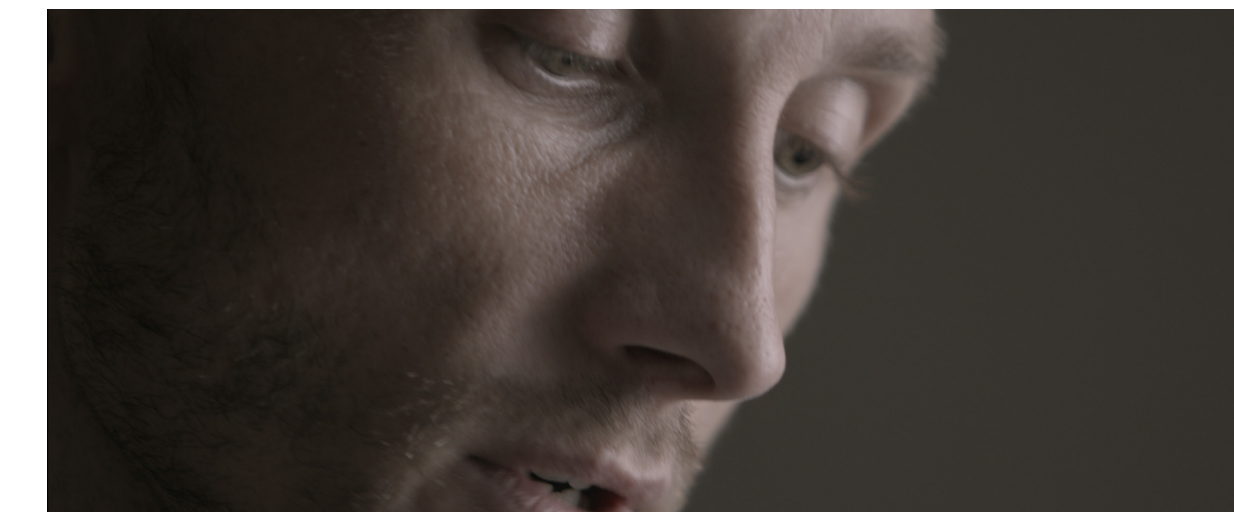


Fig. 08
Artur Ligęska. Still from Sing and Cry, Cry and Sing [AT/UK 2021] © Manu Luksch 2021

Fig.09
Artur Ligęska described the isolation cell at Al Sadr. Still from Sing and Cry, Cry and Sing [AT/UK 2021] © Manu Luksch 2021



Fig.10
People in Manchester are holding a protest against the unconditional business partnership between Manchester City Council and Emirati investment companies. Film still by the author. 1 June 2018

¹ Brian Holmes (2009), "Guattari's schizoanalytic cartographies or the pathic core at the heart of cybernetics", *Continental Drift: the other side of neoliberal globalization*, brianholmes.wordpress.com/2009/02/27/guattaris-schizoanalytic-cartographies/

² For an in-depth discussion on the role 'the digital' plays in producing space see James Ash, Rob Kitchin, and Agnieszka Leszczynski (2018), "Digital turn, digital geographies?" in *Progress in Human Geography* 42, 1, 25-43. doi/10.1177/0309132516664800

³ Artificial intelligence is a term coined by Amazon for the simulation of artificial intelligence by outsourced low-wage labour. See "Artificial Intelligence", *The Economist* (2006) June 10. www.economist.com/technology-quarterly/2006/06/10/artificial-artificial-intelligence

⁴ Soraya Murray (2008), "Cybernated aesthetics: Lee Bul and the body transfigured," in *PAJ: A Journal of Performance and Art* 30, 2, 38-50.

⁵ Bruno Latour (1999), *Pandora's hope: Essays on the reality of science studies*, Harvard University Press, 304.

Intimacy of Mutation

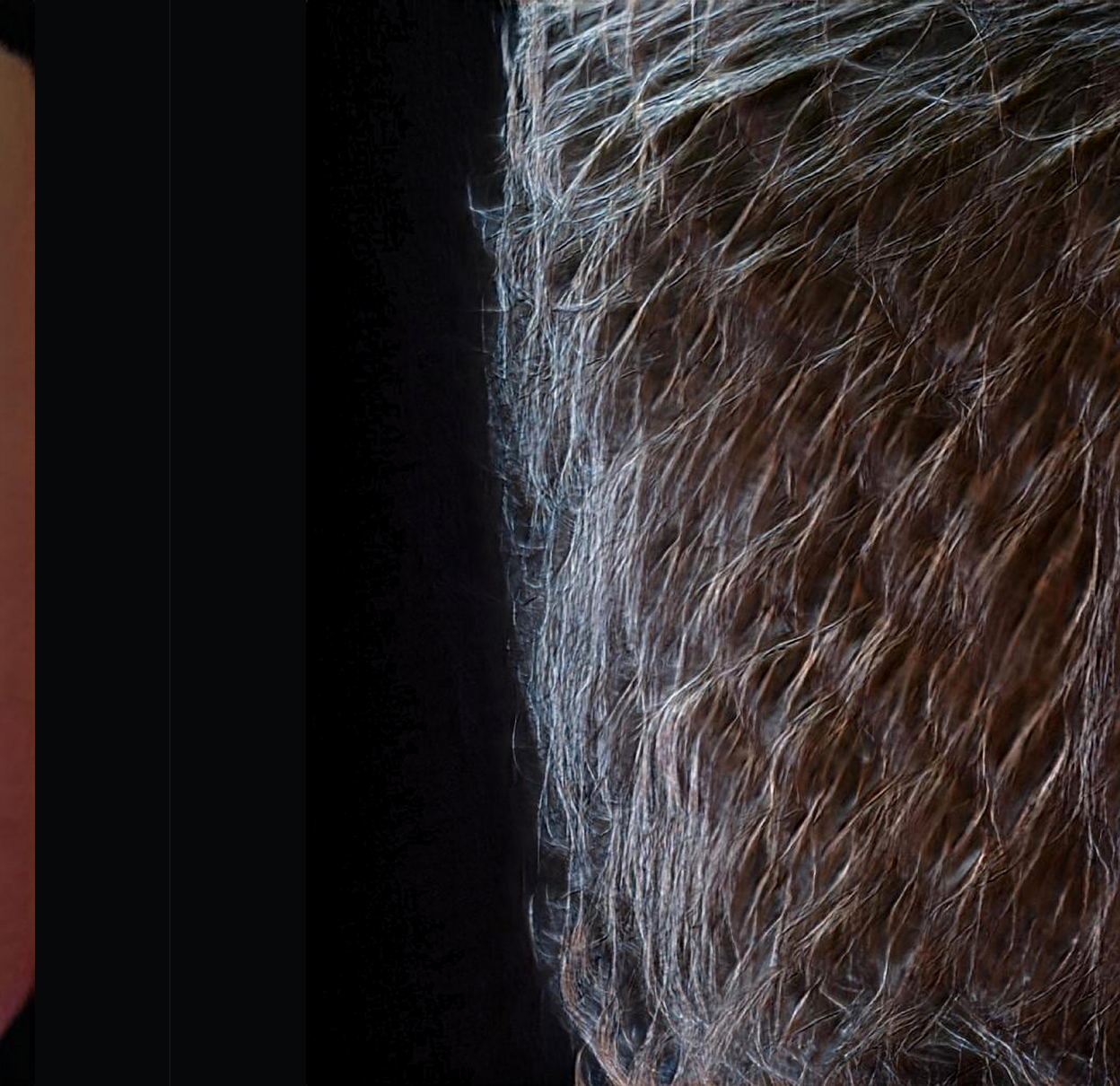
John Wild



Ox0_Noosphere
 Electromagnetic waves beaming down from the skies, fiber-optic cables emerging from the seas, copper wires woven across the continents. The earthly envelope of land, air and ocean – the realm of organic life, or biosphere – is doubled by a second



Ox1_the_digital
 The digital has escaped its systemic tethering and has become entangled in the most intimate sensorial experiences of everyday life. Bodies are the receptors of digital signals - receiving, transducing and integrating them into biological processes. The digital and bodies interface through a complex set of procedures and protocols that include the ontic ma



Ox2_ontics
 The digital is rooted in the representation and storage of information in the form of binary signals using physical qualities such as voltage or magnetic polarisation. Digital systems translate all input into binary structures of 0s and 1s, which can then be stored, manipulated, and transmitted as a sequence of voltage pulses. Invisible labour integrates human bodies into the materiality of digital systems forming



Ox3_aesthetics
 The conversion between analogue and digital produces aesthetic qualities beyond the technical - it alters how things look and feel. The digital slips from its material origin to describe the aesthetics and artefacts of digital processes. Algorithms subsumed within software directly influence the look and feel of everyday artefacts. Digitality, then, is an aesthetics, capturing the pervasiveness of digital processes



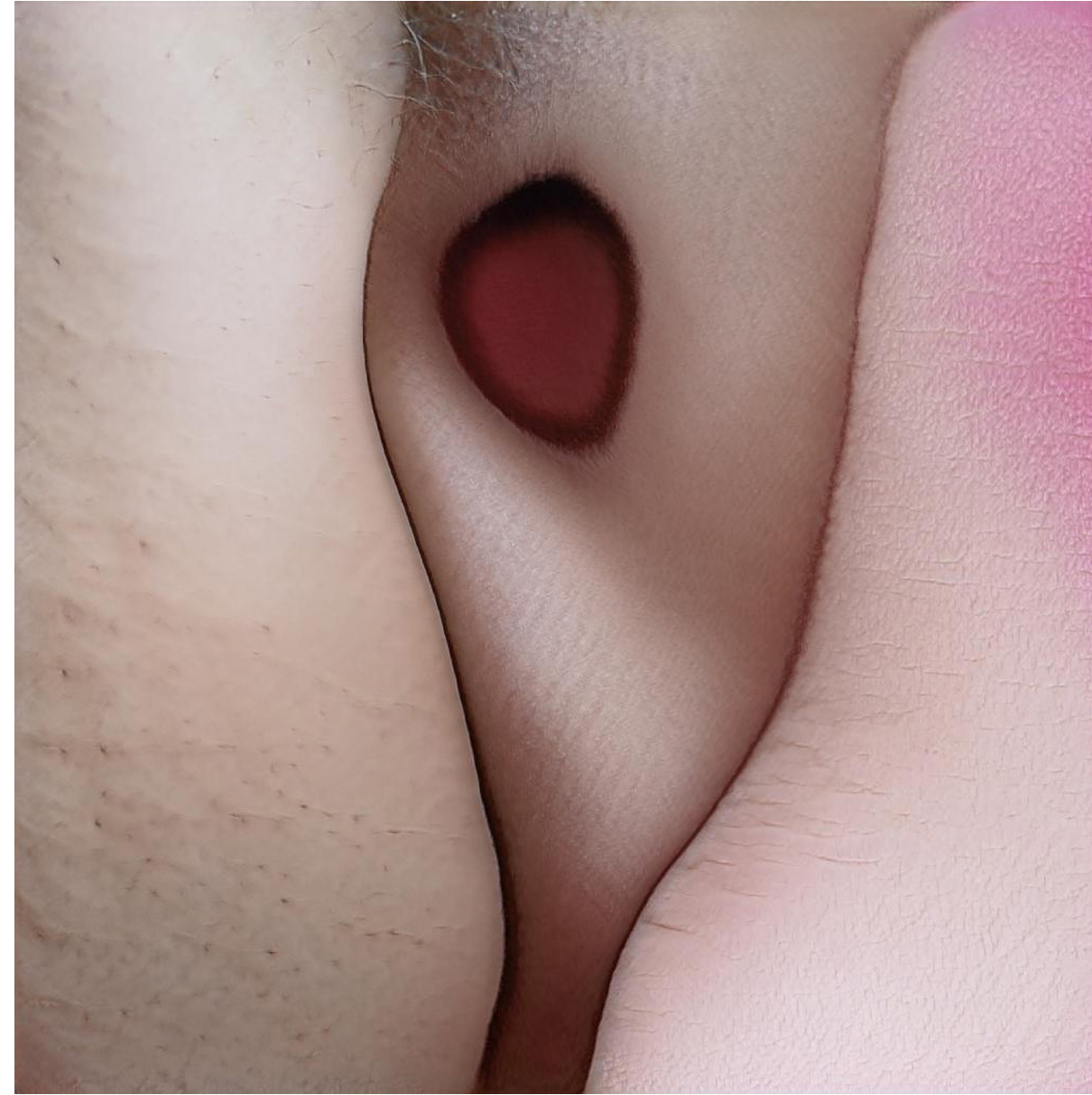
shaping how bodies experience space and spatiality (socio-spatial relations) as always already 'marked by circuits of digitality' that are themselves irreducible to digital systems.' 'the digital' has become too entwined with culture for it to be dislodged entirely and identified discretely. It has become an integral part of the human sensorium - the total sensory environment perceived by bodies.



Ox4_atmospheres

Technical objects are not lifeless mechanisms but actively produce spatiotemporal atmospheres, which shape bodies immersed in these atmospheres. Technical objects relate to one another and to human beings outside of human consciousness or intentionality. Invisible machine-to-machine interaction hidden within 'black-boxed technologies' sinks into the background of human perception. Technical objects relate to one another through 'perturba-

tions', which are active in the production of atmospheres (a term that refers to the circulation of perturbations to produce space times local to technical objects).⁶ Machine-to-machine interactions outside of human perception create atmospheres beyond their technical function. These atmospheres are real moments of space-time that are felt by bodies and shapes the capacities and conduct of both humans and non-humans.



Ox5_logics

The digital not only influences how space is felt and understood, it also impacts on the structure and ordering, the quotidian rhythms,⁷ time, flows and spatial configurations. For example, automated systems operated by companies such as Deliveroo create configurations of people and flows of cyclists, subtly contributing to the production of the spatial ambience of city space. The implementation of Machine

learning provides digital systems agency to order and re-order physical space and temporal flows. In the US, Machine Learning has been deployed to police bodies using systems that preemptively predict crime⁸ or identify potential terrorists at its borders.⁹ Digital logics play a role in structuring and re-structuring the space-time of lived experience.



Ox6_discourse

The digital functions through discourse which actively promote, enable, secure, and materially sustains the increasing reach of digital technologies. Discourse is understood in Foucauldian terms as the narratives, cultural myths, ideologies, or unacknowledged assumptions that inform and impart direction to the micro-practices of everyday life and influence wider social goals. Narratives have long been used

as tools in the infrastructures of power and control. Understood as representations of the world, they are increasingly automated. Machine learning algorithms, presented as disinterested scientific rational actors, develop narratives which reproduce social hierarchies, division, and exclusion, often based on bodily characteristics of race, gender, class, and sexuality.



Ox7_sympathetic nervous system

Heart rate and blood pressure increase, adrenaline released, blood vessels constrict, pupils dilate, pores open, and sweat is excreted. Beads of perspiration glisten visibly on the skin as the body is penetrated by digital signals below the level of conscious cognition. The digital engages in a nonconscious connection with the body's sympathetic nervous system

producing states of arousal, anxiety, or depression. The digital connection to the sympathetic nervous system is a powerful interface and plays an instrumental role in political propaganda and the mobilisation of bodies both to sustain and disrupt systems of power and control.



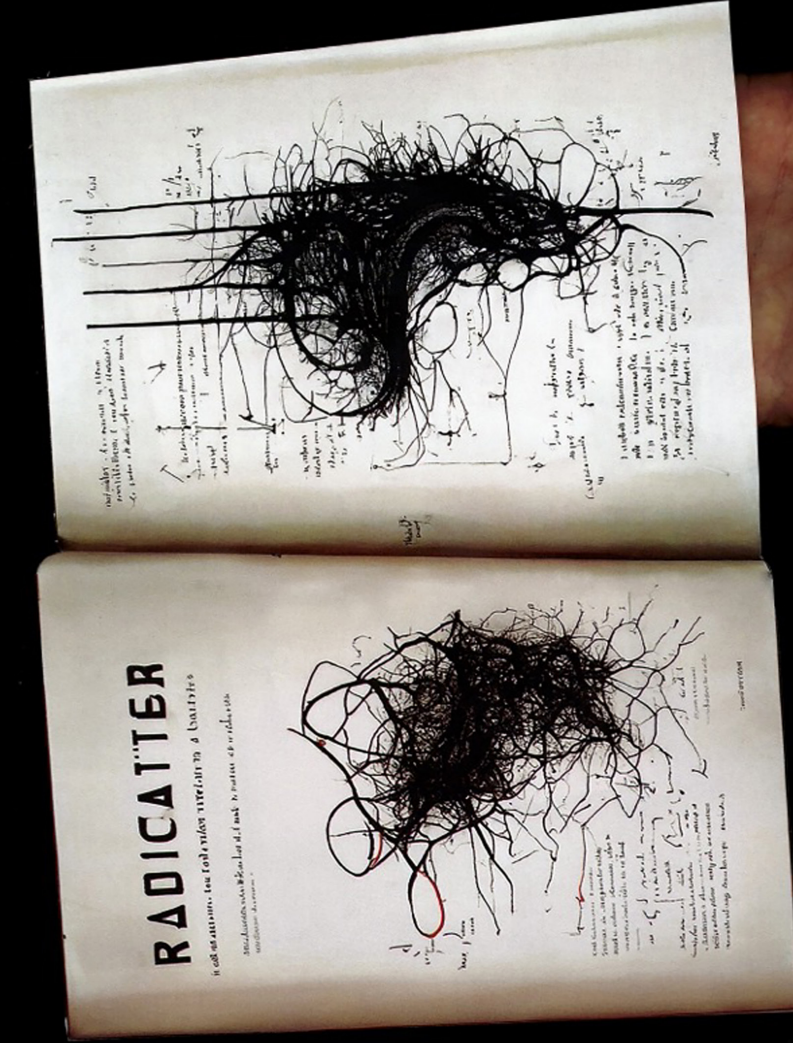
Ox8_Intimacy of Mutation

Artificial intelligence (AI) feeds off human bodies, extracting data, analysing, mapping, forming abstract representations and extracting surplus value from our most intimate interactions, desires, and dreams. Intimacy of mutation explores the algorithmic gaze¹⁰ of machine learning to investigate how 'the digital'

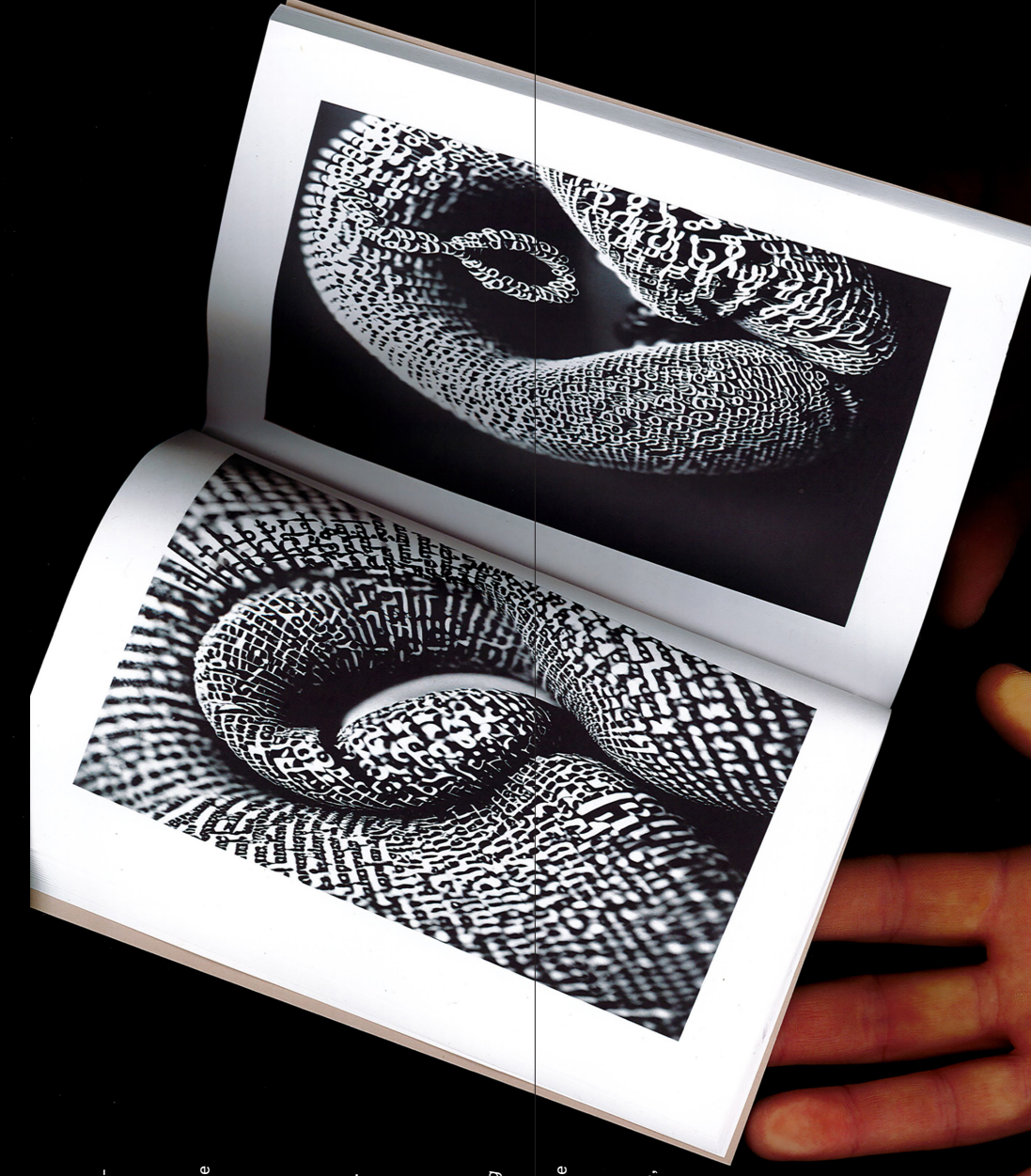
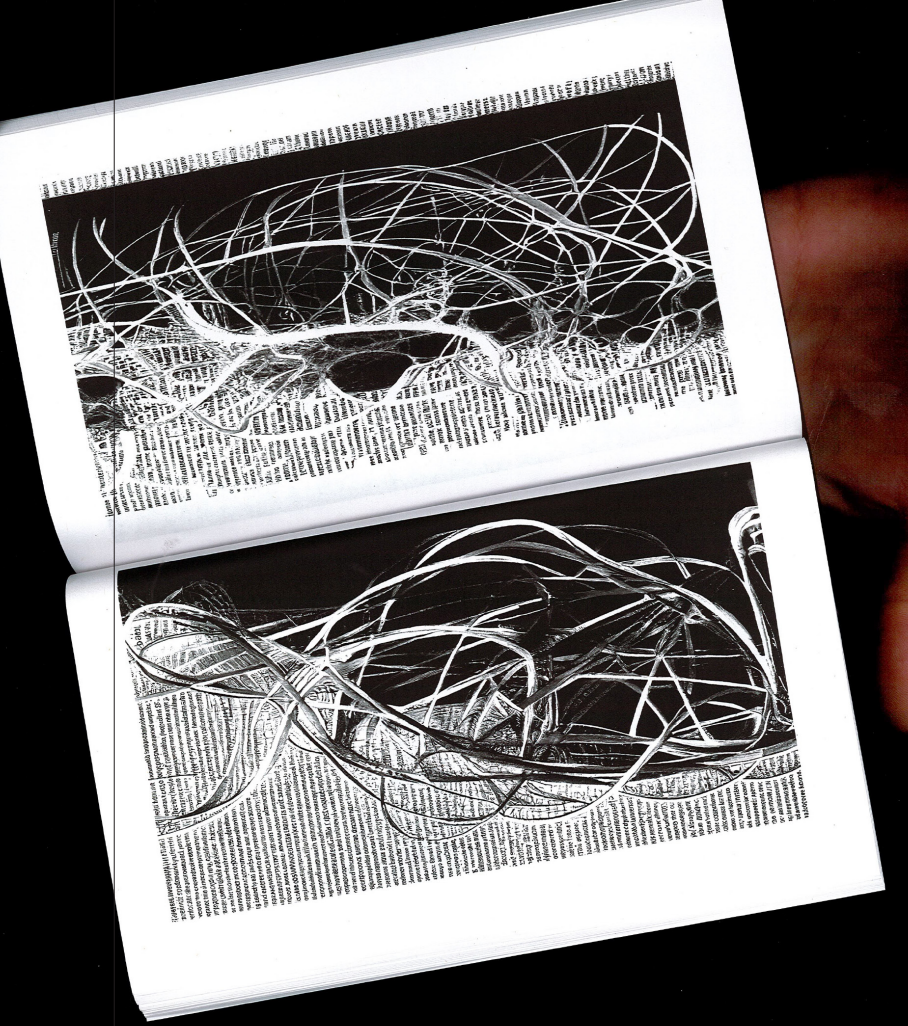
unfolds within bodies. Intimacy of mutation does not try to present a universal Human body. It functions as a corrupt data set, presenting a forensically intimate mutating portrait of a singular non-binary body that refuses the stability of gendered biological construction.

(This excerpt comes from a longer essay documenting the thinking and positioning of these images)...

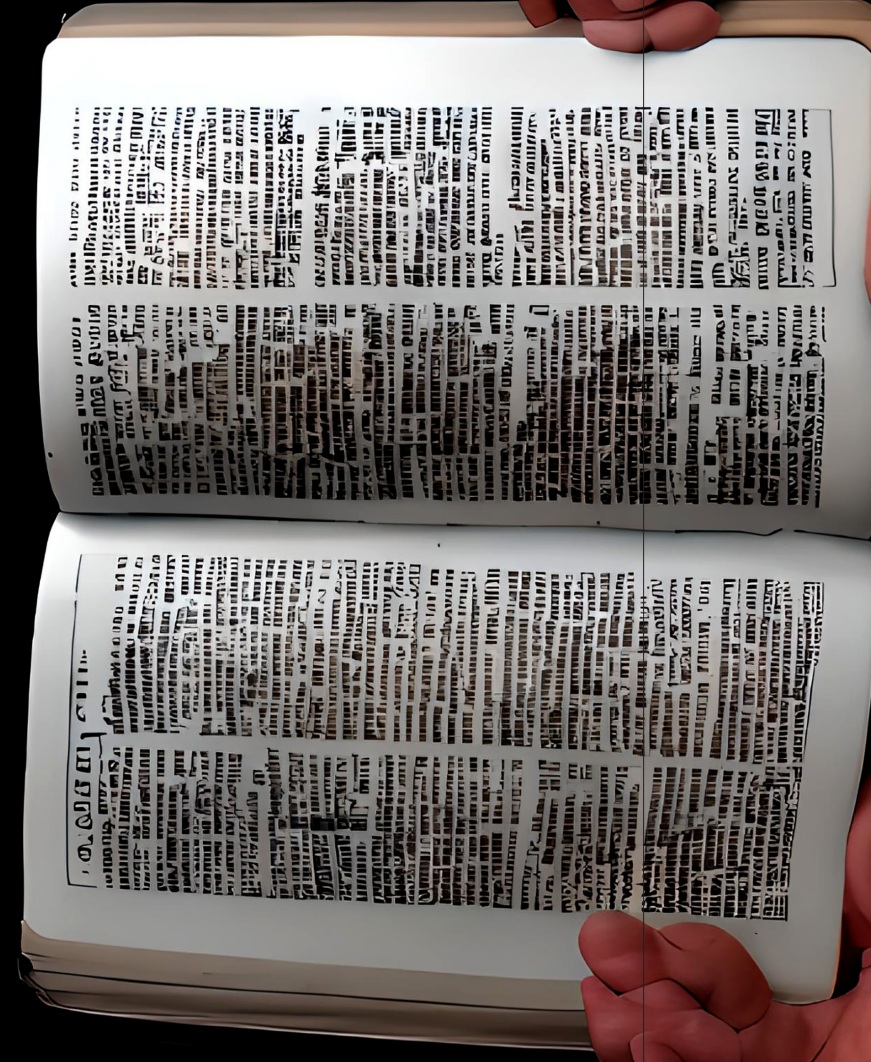
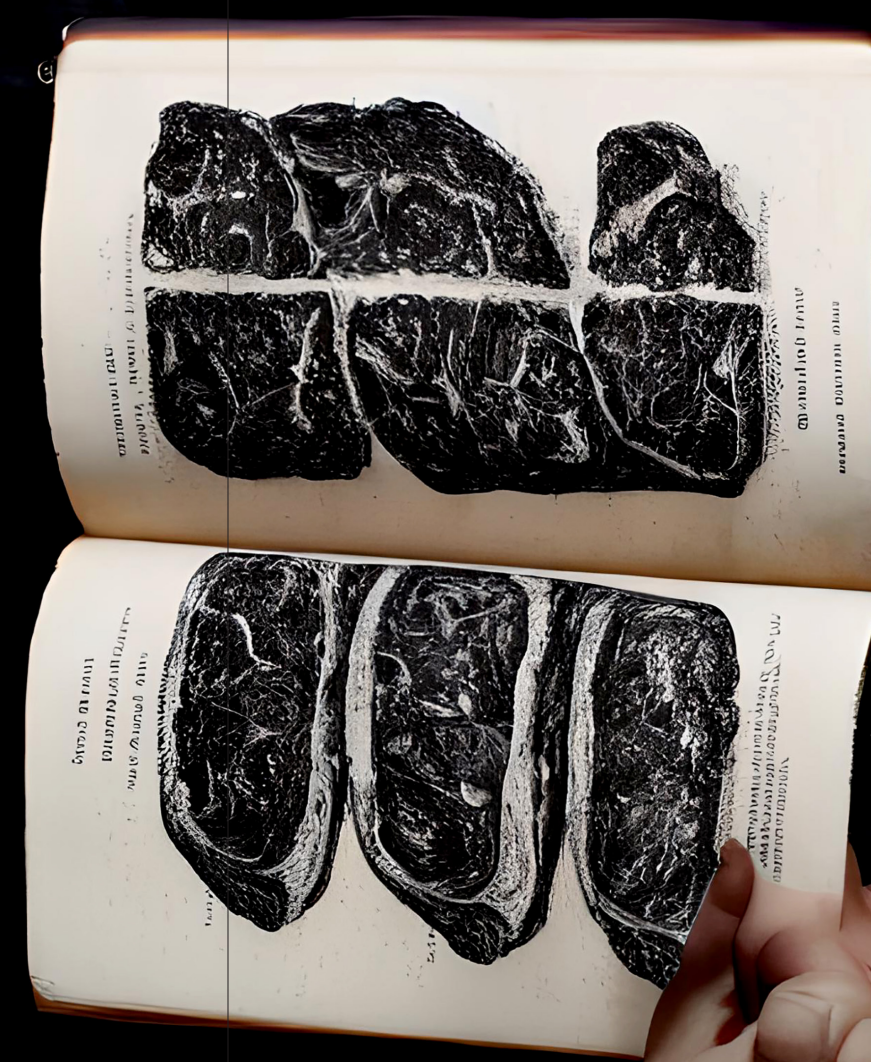
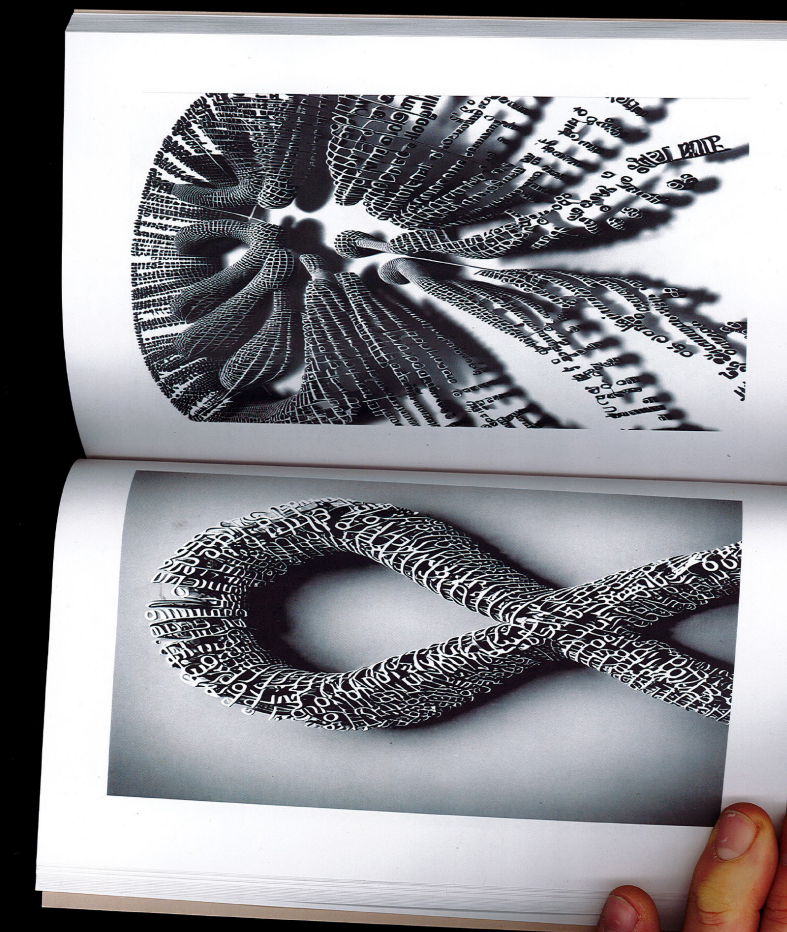
Jonathan Boyd



... these fictionalings are assigned to a *patheme-matheme*¹ designation and look to provide alternative models for understanding the poetics and materialities of artificial intelligence...working somewhere between order and disorder...utilising rationalised computational systems and human intentionality...they offer a (dance)assemblage of emotional desire and the computational indifference...a searching for new poetic languages that speaks to a need outlined by nora n. khan in her essay *'towards a poetics of super intelligence'*... khan lists several poetic descriptors...the 'hurricane'...the 'swarm', the 'architect'...the 'sovereign'...the 'frontline' among others... evocative...although...they do not soften/blur/question the naive '(bi-)nary) perceptions/preconceptions (not that soft is easy) of the human/nonhuman relation...where is the mud' of ai, the thread of ai, the fat of ai, the wax of ai?... these are the (imagined/and not) materials that nestle amongst the connected events of the rhizome...these are the matters of thought...they give the rhizome its support (and stop it from descending into vague conceptions of an invisible network-linear (straight(ened) mappings which hide from view) and it feeds off them...wax's softness allows it to be morphed and changed through embodied acts of making...it provides an unsettling uncanniness... the 'blob'² offered science-fictioning and uncanny 'terror within 'b-movie' genres...the thread, or knot provides an equal uncertainty...never a solid structure, always in a shift of loosening or tightening...the images evidence acts of iterative creation...of scanning, prompting and scanning and so on...a soft (ie. pliable) approach...which...in its plasticity... continually folds back on itself as part of an ongoing feedback loop-ing...in this sense, these images are transformations of transformations, of transformations...the act of the (continual) 'prompt' (or) 'variation'³ goes beyond the sparking new-nowness (of the generated image) towards a type of the 'boredom' or 'dull'-ness... and the sifting and editing of these images becomes a type of processing...more admin...the image here becoming comparative to the mass produced-'dull' object'⁴ (a contemporary ready-made)...



¹ "...where the conceptual meets other kinds of the material...the image is not a simple engagement with mathematical systems or blobs; where the mathematic corresponds to the formal character of subjectivity, and the pathemic names an equally abstract - in a different - sense - but more creatively and affective character." in David Burrows and Simon O'Sullivan (2019), *Fictioning: The Myth-Functioning of Contemporary Art and Philosophy*, (Edinburgh Press), 357.
² "...isaac asimov's three laws of robotics... asimov's ethical precepts are mechanical, reductive and naively humanist...They are premised on a rather restricted idea of the robot as the human's truncated, and inherently obedient other...wax's softness allows it to be morphed and changed through embodied acts of making...it provides an unsettling uncanniness... the 'blob'² offered science-fictioning and uncanny 'terror within 'b-movie' genres...the thread, or knot provides an equal uncertainty...never a solid structure, always in a shift of loosening or tightening...the images evidence acts of iterative creation...of scanning, prompting and scanning and so on...a soft (ie. pliable) approach...which...in its plasticity... continually folds back on itself as part of an ongoing feedback loop-ing...in this sense, these images are transformations of transformations, of transformations...the act of the (continual) 'prompt' (or) 'variation'³ goes beyond the sparking new-nowness (of the generated image) towards a type of the 'boredom' or 'dull'-ness... and the sifting and editing of these images becomes a type of processing...more admin...the image here becoming comparative to the mass produced-'dull' object'⁴ (a contemporary ready-made)..."
³ an assemblage comprising of various materials, fungi, sodium etc...
⁴ "a plasticity of material means a multiplicity of functions...the image is not a simple engagement with mathematical systems or blobs; where the mathematic corresponds to the formal character of subjectivity, and the pathemic names an equally abstract - in a different - sense - but more creatively and affective character...wax's softness allows it to be morphed and changed through embodied acts of making...it provides an unsettling uncanniness... the 'blob'² offered science-fictioning and uncanny 'terror within 'b-movie' genres...the thread, or knot provides an equal uncertainty...never a solid structure, always in a shift of loosening or tightening...the images evidence acts of iterative creation...of scanning, prompting and scanning and so on...a soft (ie. pliable) approach...which...in its plasticity... continually folds back on itself as part of an ongoing feedback loop-ing...in this sense, these images are transformations of transformations, of transformations...the act of the (continual) 'prompt' (or) 'variation'³ goes beyond the sparking new-nowness (of the generated image) towards a type of the 'boredom' or 'dull'-ness... and the sifting and editing of these images becomes a type of processing...more admin...the image here becoming comparative to the mass produced-'dull' object'⁴ (a contemporary ready-made)..."
⁵ "the image of the subject, blob-like alien is part of the long history of images of extraterrestrial life...the image is not a simple engagement with mathematical systems or blobs; where the mathematic corresponds to the formal character of subjectivity, and the pathemic names an equally abstract - in a different - sense - but more creatively and affective character...wax's softness allows it to be morphed and changed through embodied acts of making...it provides an unsettling uncanniness... the 'blob'² offered science-fictioning and uncanny 'terror within 'b-movie' genres...the thread, or knot provides an equal uncertainty...never a solid structure, always in a shift of loosening or tightening...the images evidence acts of iterative creation...of scanning, prompting and scanning and so on...a soft (ie. pliable) approach...which...in its plasticity... continually folds back on itself as part of an ongoing feedback loop-ing...in this sense, these images are transformations of transformations, of transformations...the act of the (continual) 'prompt' (or) 'variation'³ goes beyond the sparking new-nowness (of the generated image) towards a type of the 'boredom' or 'dull'-ness... and the sifting and editing of these images becomes a type of processing...more admin...the image here becoming comparative to the mass produced-'dull' object'⁴ (a contemporary ready-made)..."
⁶ "a viscous substance like pitch is an aberrant fluid, at first, with the appearance of a fluid it manifests to us a being which is everywhere fleeing and yet similar to itself...the viscous reveals itself as essentially dubious (touche, because it exists in slow motion; there is a sticky thickness in its liquidity; it represents in itself a dawdling firmness) to the solid over the liquid...this firmness is a possession... Jean Paul Sartre (1943), *Being and Nothingness*, (Gallimard) 48.
⁷ prompt and variations tools in text-to-image generators that allow continual iterative image generation.
⁸ "...based on a reaction of visual indifference, with which the viewer is not concerned of good or bad taste..." (Musical Museum, the museum of modern art, new york, october 19, 1961)



Dead Quotes

Ivonne Gracia Murillo & Maximilian Gallo

a flat object made from a tree with flexible parts on which are imprinted lots of funny dark squiggles⁹ describes the possible events, and the possible correlations between them¹⁰ we are this network of meetings and exchanges¹¹ the thoughts and emotions that bind us¹² a forgotten account with accumulated interest¹³ bound to thin sheets of paper or dancing between the microchips of a computer¹⁴ speaking with those who are not yet born¹⁵ no matter how far distant in place and time¹⁶ crossing seas and decades, sometimes even centuries¹⁷ communicating with the dead¹⁸ that too is time. a strange distorter of perspectives¹⁹ we don't actually need to be in the same place at the same time for these exchanges to take place²⁰ across the millennia, an author is speaking clearly and silently inside your head²¹ nothing less than magic²² books break the shackles of time.²³

⁹ Carl Sagan (2003 [1980]). *Cosmos*, Abacus/Little Brown Book Company (London), 296. ¹⁰ Carlo Rovelli (2017). *El orden del tiempo*, Anagrama (Barcelona), 94 (translated by the authors). ¹¹ Rovelli, *El orden*, 93. ¹² Rovelli, *El orden*, 94. ¹³ Joan Didion, as quoted on nitch.com/posts/1670619062. ¹⁴ Rovelli, *El orden*, 94. ¹⁵ Galileo Galilei (1632), *Dialogo dei massimi sistemi*, as quoted in Italo Calvino (1996 [1988]). *Six Memos for the Next Millennium*, Vintage (London), 44. ¹⁶ Galilei, *Six Memos*, 44. ¹⁷ Galilei, *Six Memos*, 44. ¹⁸ Galilei, *Six Memos*, 44. ¹⁹ Galilei, *Six Memos*, 44. ²⁰ Galilei, *Six Memos*, 44. ²¹ Galilei, *Six Memos*, 44. ²² Galilei, *Six Memos*, 44. ²³ Galilei, *Six Memos*, 44.

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SynthDef("Ang", {arg inBus = 0, outBus = 0, modRate = 1, gate = 1, atk = 0.1, dec = 0.1, sus = 1, rel = 0.1, maxDelay = 0.01, minDelay = 0.001, decayTime = 1, curve = 1, outAmp = 1, wet = 1; var env, sig; sig = CombC.ar(In.ar(inBus, 1), maxDelay, SinOsc.ar(modRate, 0, (maxDelay * 0.5) - minDelay, (maxDelay * 0.5) + minDelay), decayTime, outAmp); env = EnvGen.ar(Env.linen(atk, sus, rel, wet, curve), doneAction: 2); Out.ar(outBus, env, sig); }).add;

SynthDef("psp", {arg inBus = 0, outBus = 0, threshold = 10, outAmp = 1, gate = 1, numFrames = 6, initFlag = 0, atk = 0.1, sus = 1, rel = 0.1, wet = 1, curve = 1; var sig, env, inSig, chain; chain = FFT(LocalBuf(8192)) * 1, In.ar(inBus, 1)); chain = PV.PartialSynthP(chain, threshold, numFrames, initFlag); sig = IFFT(chain) * outAmp; env = EnvGen.ar(Env.linen(atk, sus, rel, wet, curve), doneAction: 2); Out.ar(outBus, env, sig); }).add;

//distribute
SynthDef("add", {arg outBus = 0, filter = 0.5, rate = 1, atk = 0.1, sus = 1, gate = 1, filtFreq = 1000, rel = 0.1, curve = 0, verbMix = 0.5, freq = 100, numHarm = 25, mode = 0, lag = 1, freeze = 0, buf, outAmp = 1; var sig, sig2, verb, chain, chain1, chain2, env; sig = Blip.ar(freq, numHarm); sig2 = PlayBuf.ar(1, buf, BufRateScale.kr(buf) * rate, loop: 1); chain1 = FFT(LocalBuf(8192)) * 1, sig; chain2 = FFT(LocalBuf(8192)) * 1, sig2; chain = PV.SpectralMap(chain1, chain2, filter, freeze, 1, mode); sig = IFFT(chain) * outAmp * 0.75; 12.do{verb = AllpassC.ar(sig, 0.06, Rand(0.001, 0.06), 3)}; sig = (1 - verbMix) * verb + (sig * verbMix); sig = BPF.ar(sig, filtFreq, 0.1); env = EnvGen.kr(Env.linen(atk, sus, rel, 1, curve), doneAction: 2); Out.ar(outBus, sig * env); }).add;

SynthDef("bnd", {arg inBus = 0, outBus = 0, freq = 100, rate = 2, numHarm = 25, verbMix = 0.5, atk = 0.1, sus = 1, rel = 0.1, curve = 0, mode = 0, buf, amp = 2; var voiced, sig, numBands, bandFreqs, carrier, verb, env; bandFreqs = (0.32 - 1).linep(0, 32 - 1, 100, 8000); sig = PlayBuf.ar(1, buf, BufRateScale.kr(buf) * rate, loop: 1); voiced = Blip.ar(freq, numHarm); carrier = SelectX.ar((ZeroCrossing.ar(sig).cpsmidi.lag(0.1) > 5000.cpsmidi).lag(0.05), [voiced, PinkNoise.ar]); sig = Amplitude.ar(BPF.ar(sig, bandFreqs, 0.05), 0.01, 0.05); sig = (BPF.ar(carrier, bandFreqs, 0.001) * sig).sum * 30.dbamp; 12.do{verb = AllpassC.ar(sig, 0.06, Rand(0.001, 0.06), 3)}; sig = (1 - verbMix) * verb + (sig * verbMix); env = EnvGen.kr(Env.linen(atk, sus, rel, 1, curve), doneAction: 2); Out.ar(outBus, sig * env); }).add;

SynthDef("crs", {arg inBus = 0, outBus = 0, rate1 = 2, rate2 = 2, numHarm = 25, verbMix = 0.5, atk = 0.1, sus = 1, rel = 0.1, curve = 0, buf1, buf2, amp = 2; var voiced, sig, bandFreqs, carrier, verb, env; bandFreqs = (0.32 - 1).linep(0, 32 - 1, 100, 8000); sig = PlayBuf.ar(1, buf1, BufRateScale.kr(buf1) * rate1, loop: 1); sig = PlayBuf.ar(1, buf2, BufRateScale.kr(buf2) * rate2, loop: 1); carrier = SelectX.ar((ZeroCrossing.ar(sig).cpsmidi.lag(0.1) > 5000.cpsmidi).lag(0.05), [voiced, PinkNoise.ar]);
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Octopussy: King of the Feminists (pirate version)¹

Johnny Golding

“The octopus might watch some of the arm’s wandering as if it is a spectator. [...] [T]here is a conductor, the central brain. But the players it conducts are jazz players, inclined to improvisation, who will accept only so much direction. Or perhaps they are players who receive only rough, general instructions, from the conductor, who trusts them to play something that works.”

Peter Godfrey-Smith (2018): *Other Minds: The Octopus and the Evolution of Intelligent Life.*²

“We can fuck as practice towards freedom.”

Keguro Macharia (2021): *Diaspora, Humanism and the Global Project of Black Freedom.*³

¹ Written in honour of Kathy Acker – who long ago passed through the blood-brain barrier with all the guts, curiosity, intelligence and more of our Octopussy. This is for you, my friend. Thanks also to the artists/editors Anja Casser and Matias Viegner (2022), who placed Octopussy amongst her notebooks and wildly psychedelic knowledge systems, all compiled in their Kathy Acker: *Get rid of meaning*. Badischer Kunsterverein, Verlag der Buchandlung: Köln, 259-277.

² Peter Godfrey-Smith (2018), “Ch 4: From White Noise to Consciousness,” *Other Minds: The Octopus and the Evolution of Intelligent Life*, (New York: Farrar Straus and Giroux), 104-105.

³ Keguro Macharia (2021), *Diaspora, Humanism and the Global Project of Black Freedom*, co-speaker with Zakkiyah Inman Jackson and Rinaldo Walcott in conversation with Christina Sharpe, Inaugural Del & Wanita Smyth Lecture, York University, Toronto, Canada, 3 Feb 2021. [youtube.com/watch?v=nSbD-B_xDWg](https://www.youtube.com/watch?v=nSbD-B_xDWg)



Photo credit: Lubo Ivako, Getty Images

Octopussy opens her eye.

Her squared one pupil situated somewhere on a kind of forehead pulsates with the white noise of a somethingness. Eight mouth-earpits-vagina-testes stretch and yawn, albeit at atonal floatily semi-swollen intervals. She-He-It-They have never seen a *vagina dentata*, but rumour has it that somewhere in the big out-there, *vagina dentata* exists and does so in wolf-like packs or via loner assassin black widow spider webs. Perhaps, conjectures Octopussy, a *vagina dentata* is some kind of toothy-ridged muff-hole similar to his two-part scissor-like beak – but more fun. Maybe it is closer to a series of eviscerating dark matter vacuums, driven by oddly spirited pleasure nymphs whose only collective goal is to emasculate and squeeze; to chomp and disembowel in one elegant orgasmic rip any and all who might venture into SHIT’s variegated suckered thigh-high hole(s).⁴

From the toughest of the tough to the weakest of the weak – how strangely democratic! So today five of their eight tentacles will do a bit of a recc’y. Cannot be that difficult, muse several of his suckers simultaneously, to seek out a certain kind of knowledge, to seek out a certain kind of *intelligence*.

Octopussy rifts on the question of creation and the role of genitalia.

The great thing about Octopussy’s consciousness on this and other creation myths was that its ‘aliveness to the great out there’ seemed to come alive precisely in the stretch-time of the classical modernist 4’33” symphonic movement of silence. Her inhabiting of this strange kind of silence – the silence of emergence, the silence of wonder(ing)/wander(ing), floating around and rifting on the rifts – not only enabled a whole series of mad, wild forms of imaginative concertos in eight-part harmony

(nine if one counted the eye-brain blob head if and when it might enter the make-it-up-as-you-go-along listening fray), but also encouraged a profound set of yearnings for soaking up the wet wet wet of pleasure, decadence, mutation and slime. “Oh, What the Hell!” would sing Octopussy to the water gods. With his eight arms dancing a rumba-cum-improv, the ensuing accidental and dizzying encounters produced – perhaps not unsurprisingly – specialised fractals of sense and sensation, elegant, electrified currents (and slices of electrified elegant currents) stretching out in all directions at once. Their colourful vibrations shapeshifting between and amongst sound and image, wave, light-bundle and dot, simultaneously releasing multiple dimensionalities of octopussified serotonin dreamscapes, tsunami diptychs and perhaps even a speed-series game of Go!

Octopussy encounters deep learning and the importance of the game.

In the manifest fullness of those oddly cathected rhythm beat hums and strategically placed double-convex bursts of sand, wave and vibration, Octopussy begins to find themselves playing a game. It is an odd sort of game, deeply strategic, achingly complex, but with a kind of compelling mean-spirited attraction impossible to ignore. She chooses black; their opponent, cleverly disguised as dead fish, assumes white. The game begins. As Octopussy takes a moment to consider his next move, suddenly SHIT’s vagina-mouth-phallus-testes apprehends the maggotry of this entire composition, the maggotry of calculated probabilities gone deep and wide (albeit scattered across the surface of a 40x40 cm shin-kaya replicated board via white pellets and

⁴ The acronym SHIT deriving from ‘She-He-It-They’ emerged during the pre-histories of today’s world, when those of us who never felt comfortable with binaric divides on the one side or genital-less androgyny on the other (but somehow occupied the unworldly worlds of butch or femme (or butch and femme) or radical fairy or drag king or drag queen or dragster or drag king and queen at the same time or something else altogether or not yet invented) found succour in the excremental joys of this particular kind of She-He-It-They corporeal pluralism.

Just saying.

the genius (so-called) of its machinic master, Alpha-Go[d]). Deadfish drops its pellet at an inter-section Octopussy had not had a minute to contemplate, build or protect! The sucker on her furthest and longest tentacle tries to reconstruct the path to this bloated elsewhere-nothingnesses instant move made by Deadfish, this strategic fold of hell writ large, but not adding up. All initial moves have long since metastasized into strange morphogenic encounters, with no arrows of time, save for the pretence of a vector that can only venture forward or, more likely, (given Octopussy’s pellets now surrounded by alpha-fish neural networks of seizure and control), of stopping altogether. As the tentacles dance this way and that, around the coral multitudes, around the wet solitudes of oceanic flotsam and quill; as she contemplates her next move, whilst simultaneously on the move, surrounded as he is by the murderous intoxicating conundrums of this ancient game, she realises there is no move. Defeat is imminent. Resigning to this strangely attractive elsewhere set of nothingnesses, devoid, as it seems to be, of even the most basic garden-variety sensualities of seaweed, coral, blood, starfish and dirt. Octopussy learns a feeling not heretofore encountered: loneliness. Not quite the Siren’s song he long ago imagined, one that would orgasmically suck her onto the rocks and pierce all her genital-earpits-mouths with the glory of burning ice. No, this neural network raconteur cleverly disguised as an alpha-go dead fish was only capable of offering sterilised text-book intelligences. The failed promise of a cut-and-thrust-to-come, Octopussy found himself drained, empty, bored. Strangely disfigured. It was not just sour grapes at having lost (though this clearly did leave a small sting in her tails). It was that despite a myriad strategies and feedback loops on offer, the game seemed so cleanly single-minded. A bit anal retentive. In the olden days, she clocked, the end-goal was the mid-goal-in-the-process-of-becoming-goal; but these days, the end goal was just the win. Like colouring within the lines and calling it art.

Octopussy thinks on the problem called matter.

You see, Octopussy loved to have fun. Sometimes it took the form of humming, organised especially though not exclusively through that exquisite dark squared semi-conductor-pupil-eye, with its orchestra of consciousnesses, playing as many tunes of science and of life as one could invent in a nano-second or less. She loved the fluid shapeshifts of their body – sometimes flat, sometimes stretching in all directions at once, with his many suckers, his vagina-mouth-earpits and tentacles of curiosity, experiment and risk, often sticking to floating bits of fluff for no reason other than that it could. Not for a minute did he worry about being outside (or inside) the world. They were world; they were matter and that was all that mattered. She knew of wetness. She knew of appetite. She even knew of ambush, camouflage, battle and now, even boredom, as somehow entailing matter whilst being matter. She knew of sleepiness, pleasure, pain, even jealousy. She was quite well aware of scale, dimension, and, indeed, size. In fact, Octopussy often mused on the problem of size, especially since this particular form of measurement seemed deeply to trouble many of her comrades – especially those other species who were endowed only with a single set of phallus-testes protrusions. Not only was this particular size-measurement thingy considered to be the ‘be-all’ and ‘end-all’ but sometimes – maybe even most times – it seemed that it was given some kind of privileged, ontological status, somehow the god-head of all that could or should matter. SHIT secretly wondered if perhaps this measurement-confusion-with-a-being-existence-onto-theo-logical-foundation-to-knowledge (and to the aliveness of life) might be driven by some kind of hormonal imbalance. Perhaps it was, rather, driven by an unconscious wound, now imprinted deep in the subconscious, cultural morays or cavernous religious mytho-poetics of those said entities endowed only with that single phallus-testes protrusion. Octopussy was particularly amused with its corre-

late doctrinaire descriptor called ‘penis-envy’ – that bizarre anti-addendum to an already mad approach regarding measurement and size. Usually meant as some kind of insult, flung in the direction of those who had not quite reached the octo- part of pussy, Octopussy often, though not always, saw through all that rubbish and, as much as could octopussily be done, simply ignored this collective slack intel on the question of size. “Well,” as she often laughed to herself, “whatever will they think of next?” He did not have to wait long for an answer. And to be fair, dear comrades, it was not a pretty answer. Not pretty at all.

Octopussy fights the net.

Until it was of course too late, Octopussy did not realise that today might be its last. True, her life span was ever only 3 years max, but as there was no way to know in advance the exact hour, minute and manner of their death, he did not really give it a second, third or fourth thought. And at any rate, what really did it matter – three years or three million – in the grand, deep-time scheme of things, it was all much of a muchness. For a rather grand tanker of a ship was shadowing along the surface of her world, 53m above, to be exact. Normally he could have cared less. These iron-clad annoyances were forever farting out oil slip streams, plastic shite, and bombs of varying degrees of irreverent destruction. Their cavalier deployment of sonar setting off collectively bloated migraines to all and sundry was just one more example of the commonplace hideous-nasties excreted from similar type vessels of narcissistic enlightenment, so there was never a good reason or even a bad one, to go anywhere near it. Given this, it was all the more peculiar that today, today of all days, all his parts were awash with excitement once that floating tin box was noticed. This included the usually secretive fifth and eighth tentacles, who barely could disguise their now united curiosity

wrapped, as it was wont to display itself, in a kind of tangled-up tango. A certain kind of lust, a certain kind of appetite led the way; indeed, propelled the way. Off she shot, upwards, upwards, upwards, swirling with colours purple, yellow and, in the main, red. What magnificent fields of magnetic attraction resonated from its wake! Here was a proper game to be sure! And now SHIT’s legs were more like long curls snaking off its head; and now their one eye was transfixed on its object of desire and now his mandible beak scissored a few fish that got in the way. He had no idea what saturated his quest or why; he was just hungry with that all important curious blue type of hunger, exploring, compelled, eager to find out (the whatever or the nothing at all). And that is precisely when the net fell, almost dreamlike at first instant – blurry, foggy, with a certain kind of smell. But it wasn’t a good kind of dreamy or blurry; and it certainly was not fun. Suddenly the smell took on a nightmarish peanut-butter stickiness, forcing its sickly salty way into her 8 vaginas and one beak. It even stuck to his eye, this sickly peanut butter slough of cruelty – a kind of claustrophobic imprisonment that she at once understood – but could not (yet) escape.

Octopussy dreams three dreams.

The first dream required he saw off five of his protruding members. These members, still more or less alive, but with no real brain to think of, were to inch their way, slug like it has to be said, through the pockets and folds of SHIT’s entrapment, but then, once on the other side and in a kind of re-energised line-dance conga would, make enough noise to get that self-obsessed navel gazing ship to pull up its one and only, well-worn net and re-focus its self-important multi-holed ugliness towards something that might appear more shiny and more beautiful, something perhaps more compliant; something simply considered for whatever reasons, just more

better than our tangled-up Octopussy. (But even as he dreamed this, and as much as she appreciated the sacrifice its members were so willing to make, SHIT knew this would not work). Dream two involved the cone of time, feathers and a few beads. He mused to themselves, if Maxwell was at all correct with that infamous ‘cone of time’; if, that is to say, the past and future could (as it supposedly always did) fold in such a way that their entanglement created our present-tense now, then perhaps, maybe just perhaps, she could re-image her present predicament now-time as the emergence of past and present. And, not only that, perhaps they could then slip into a future void just at the very moment the fold might pop apart! A kind of transversal wormhole! Excitedly, Octopussy set about adorning her ravaged netted-body with beautiful found objects – gold, blue and black feathers in the main (probably having fallen from the erstwhile bodies of eagles, penguins, seagulls and other magnificent creatures she had only ever been told about but had not yet encountered). On each sucker she placed a shiny bead, perhaps a form of encrusted sand or maybe disused shell or even some rubbish floating in the ocean. And wow! Did he look the business! Proper wormhole travel gear if ever there was such a thing!

But perhaps – perhaps because it was the last dream of her dreams – Dream three was the very, very best. Oddly, it had to do with his maddening Alpha-go encounter. For if he had learned anything at all from that maggoty Deadfish, and it was that sense and sensuality mattered, and not only that, but because it mattered was in some real sense (maybe not the whole of sense, but in some tangible, aliveness, significant sense) was matter, perhaps even ‘the’ matter. So, there he was, thrown back into that sterilised instrumental game of reason. The irritating fluorescent lights were glaring, practically burning a hole in SHIT’S unruly brain. They felt the heat of naked, razor-fine scorn bouncing off the nameless

inventors of the game and right onto its many suckers. A weird form of bullying, thought Mx Octopussy, this relentless strategic hiss-lark game of the not-so-make-believe. The clock was ticking. The heart was ticking. The pulse was ticking. It was her move. But this time, she knew exactly what to do.

Octopussy laughs.

Of course, this was no ordinary laugh, at least not one emanating from some kind of superficial joke and its relation to their unconscious. This was a deep belly, body vibrating, head thrown back, legs akimbo laugh. It emerged without thinking; it had a bit of a rhythm, a bit of a pattern, and it lasted for a long, very long, stretch of a long, moment of space-time. Not a laugh at the insanity of her predicament (though it was rather nuts), not a laugh of the humiliated or the shamed. Less so, was it the mean-spirited laugh of the treacherous, ejaculated in the only way mean-spirited treacherous practitioners can muster (all over everyone without giving a damn). Neither was this a laugh erupting despite or because of the trauma, the loss, the cruelty, the stupidity. No, this was a very different kind of laugh. It was born from the communal entanglement of becoming. And, as it turns out, it had a name: love.

2022 A joint RCA-Angewandte approach to: **radical matter**

with Prof Johnny Golding, Martin Reinhart & Maggie Roberts

The pedagogical approach, outlined in the course syllabus that follows, has been an essential spark for the formative phase of the radical matter research project. It was rolled out in a workshop/seminar/ manner, with the intention of foregrounding the critical and novel ways the postgraduate students at the University of Applied Arts (Vienna) and Royal College of Art (London, UK) interrogated, debated, immersed themselves into this approach. Their contributions have become one of the critically core features to the overall approach, foregrounding art, art-research and art-making, at both the epistemological/methodological and wild sciences level. We see this as the basis for enhancing this new, urgent, disciplinary approach to arts-science collaboration and exchange.

The University of Applied Arts postgraduate students' end of year exhibition, together with the symposium (radical matter: RAW), was the first international public iteration of one of the key aspects to radical matter: encounter, and with it, all the 'sticky-cohesions' that encounters imply or make. We quote directly from the students' text:

Encounters reveal themselves in the field of tension between individuality and group, art and science.

Here, encounters are not just bound to this exhibition but emerge From there through here. The projects have been, are, and will go on, through some-bodies, some-time, something, somehow.

radical matter is a method that seeks to challenge the deep-seated dichotomies that have entered the world through the Enlightenment and calls for non-linear ways of knowing. We engage in a pluralistic approach through which entanglements drive our artistic research.

We, students from the Department of Art & Science at Die Angewandte, are presenting our practices under the framework of radical matter, a collaboration with the Royal College of Arts, London.

The works formed and reformed while we got to know each other this year, influencing the flow of our ongoing creative processes.

This exhibition is [was] a performative work in itself that challenges representationalism and stresses the importance of doing. Browsing through matters of response-ability, sensory poetics, ecologies, [bodily] interferences, boundaries, care and vulnerability, we are aiming for joint, but in itself very different ways of storytelling." Charlotte Bastam, Barbara Böröcz, Sabrina Bühn, Lucie Belle Blanche David, Eugénie Desmedt, Francesco Dipierro, Hanin Eisa, Carmen Pamina Farr, Maximilian Gallo, Els van Houtert, Ou Jiun-You, Karl Kaisel, Chloë Lalonde, Martina Moro, Ivonne Gracia Murillo, Lindsey Nicholson, Veronika Nogellova, İstem Özen, Dunia Sahir, Marthin Rozo, Sophie Olivia Taleja Schmidt, Claus Schöning Lam Yong, Xavi Sosa, Malashree Suvedi, Márton Zalka.'

By sharing the MA radical matter course syllabus and From there through here field notes, we invite you to enter the world(s) of mattering, in all its radicality.

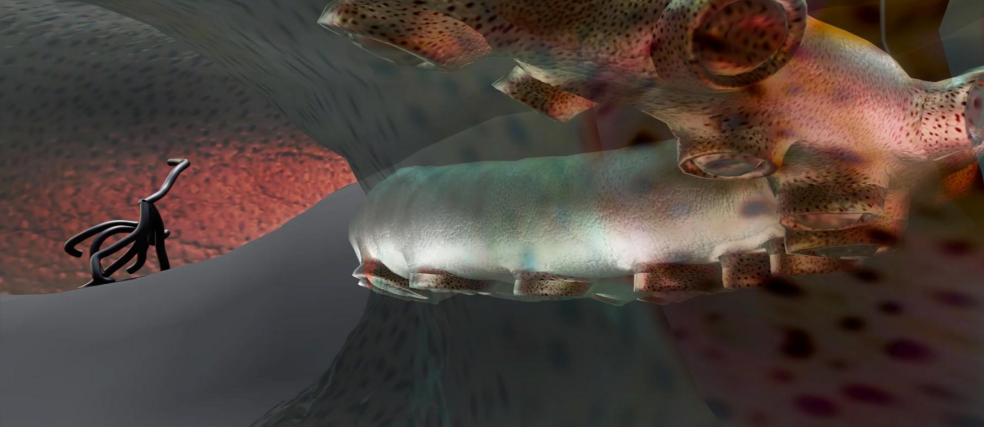
Johnny Golding and Martin Reinhart, London/Vienna 2023

* k-haus.at/besuch/kalender/ausstellung/408/from-there-through-here.html

2022 A joint RCA-Angewandte approach to: **R@DICAL mATTER** with Prof Johnny Golding, Martin Reinhart & Maggie Roberts

R@DICAL MATTER
⇒Encounter ⇒ Sense ⇒ Intelligence ⇒ Skin ⇒ Dream⇒

"When is it time to dream of another country or to embrace other strangers as allies or to make an opening, an overture, where there is none? When is that the old life is over, a new one has begun, and there is no looking back? — Sadiya V. Hartman (2021). Wayward Lives, Beautiful Experiments: Intimate Histories of Riotous Black Girls, Troublesome Women and Queer Radicals



Artists Maggie Roberts with VFX supervision by Megan Bagshaw (2021). Skin Folds. Blender, open source software.

Welcome!
Set against the coarse atmosphere of deep fakes, alt-truths, pandemics, violence, and war, we invite you on a 3.5-day practice-led journey into the complex world of the contemporary real. Underpinning this journey will be a move away from Enlightenment thinking (dare to know) towards Emergence (sticky cohesions). Touchstones for our radical matter will include: the urgency of reconfiguring the 'human' away from traditional patriarchal/racialised/anthropomorphic forms of possessive individualism/surveillance Capitalism, towards a pluriversal multi- bodied sentience, one linked to murmuration over swarm, curiosity over 'fight or flight'; emergence & encounter & entanglement as touchstones against 'object-oriented-ontologies' and other pre-fabricated metaphysics. Specific enquiries will include reference to 'single- bodied distributed intelligence' - in particular, the cephalopod, whereby tentacles / suckers, present new forms of vision, knowing, and interestingly, empathy, based on chemo-tactile and affective touch. Research will also link with 'multi-bodied distributed intelligence' (namely murmuration formations from swallows to multi-modal robotics as multiple drone involvement). Because radical matter connects also with the strange realities of AI/Distributed Intelligence within the 5th Industrial revolution of soft robotics / coding structures, emphasis will be directed towards an alternative evolution of the senses, distributed consciousness, different kinds of temporality, different kinds of materiality. With communal bodies as primary sites of intelligence, questions raised will also include: how to expand 'intelligence' away from surveillance or old forms of 'knowledge systems' toward future immersive technologies including music composition and new story-telling narrative structures (alchemic, poetic, artificial and distributed) – stories which will include fourth and fifth dimensional imaging/printing, artificial skin, resonance/vibration 'hearing' and chemo-tactile 'vision'.

The primary aim of Radical Matter will be to develop your sense of curiosity as an inhabited method for your art-science-future knowledge system practice. As an intensive and (hopefully) wild expansion of what being human means in relation to non-human/ more-than-human lifeworlds and what it means (or might mean) to communicate with the unknown, radical matter will also touch on the barely imaginable, the infra world. Over the next 3 days (Mon-Wed), then a collective assemblage (as it were) for part of Friday, we will be:

- Concentrating on a form of poetics, coupled with questions around knowledge systems (alchemic, artificial and distributed), fourth and fifth dimensional imaging/printing, with emphasis on skin: sexual, erotic, political, ephemeral, hunted,
- Exploring & making tools for reimagining our embodiment as fluid-becomings. Referencing forms of knowledge gathering such as interspecies communication and wild swimming/free-diving - with the body (extended or otherwise) as a primal site of intelligence.
- Researching sensorium based on senses we do not really have – the octopus's chemo tactile navigation, for example.

in short: let's take a walk on the wild side of matter – a profoundly radical matter - where art, philosophy and science shape-shift, flow, feedback loop and emerge both on and as the playing fields of life.

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Note: The readings/watchings/listenings/ are listed below and linked to each day. You are not expected to read everything – be judicious and led by your curiosity – but make sure you have some done before the day begins otherwise your experience will be sorely limited. Unless otherwise indicated, all readings can be found in the Reading Room:
<https://drive.google.com/drive/folders/0B1OYbaei9xQVWFzV18RlJlM007?resourcekey=0-JQeijd3ajl4mN40z4GXPKw&usp=sharing>

Monday, 7 Mar
DAY 1: Encounter ⇒Sense [on the road to find out (the whatever)]

Manifesto:
2. To affect, or being by a certain state, by subjecting to, or treating with, a flux. "I affected my brother's world."
3. Med. To cause a discharge from, as in purging, flux (diarrhea), or (Chf., etc.) to cause a discharge from the bowels or other parts of the body.
1. Med. A flowing or fluid discharge from the bowels or other parts of the body, as in purging, or menstrual discharge, or, the bloody flux, or dysentery.
2. The matter thus discharged.
Flux: the world of bourgeois sciences, 'academic': professional & commercialized culture. PURGE the world of dead art, mediation, artificial art, abstract art, illusionistic art, mathematical art, — PURGE THE WORLD OF "EUROPEANISM"!
2. Act of flowing: a continuous moving on or passing by, as of a flowing stream, a continuing succession of changes.
3. A stream, esp. a river, flood, outflow.
4. The setting in of the tide toward the shore. Cf. REFLEX.
5. Mvt of being liquid through heat, fusion, run.
PROMOTE A REVOLUTIONARY FLOOD AND TIDE IN ART. Promote living art, anti-art, promote NON-ART EQUALITY to be fully grasped by all people, not only critics, dilettantes and professionals.
7. Chem & Metall. A any substance or mixture used to promote fusion, esp. the fusion of metals or minerals. Common metallurgical fluxes are silica and potassium flux, lime and limestone fluxes, and borax (boric acid). Any substance applied to surfaces to be joined by soldering or welding, and used for during the operation, to clean and free them from oxides, thus promoting their union.
FUSE the fibres of cultural, social & political revolutionaries into united front & action.
Fluxus Manifesto (1963) Self-portrait with bandaged ear (1889) Detail. The sunflowers (1889) Vincent Van Gogh

Discussion: What is an 'encounter'? ...and why does it matter?

- Readings/Watchings/Entanglements:
Core:
1. Christina Sharpe (2016). In The Wake: On Blackness and Being, Duke University. Read as much as you can, but at least "Chapter 1: The Wake," 1-24. (In The Reading Room - henceforth; RR).
2. J-F Lyotard (1993 [1974]), "The Tensor," in his Libidinal Economy, Indiana Univ. RR. Cf.
3. Alexander C. Weheliye (2014). Habeas Viscus: Racializing Assemblages, Biopolitics and Black Feminist Theories of the Human / Reading Room but also see 2015 - "Ontologies of Blackness" <https://www.youtube.com/watch?v=SOx8BFNSJf04> and <https://www.youtube.com/watch?v=aeWBRGfGt4> and also: Acid Horizon [youtube.com/watch?v=zrnFakidDwI](https://www.youtube.com/watch?v=zrnFakidDwI)

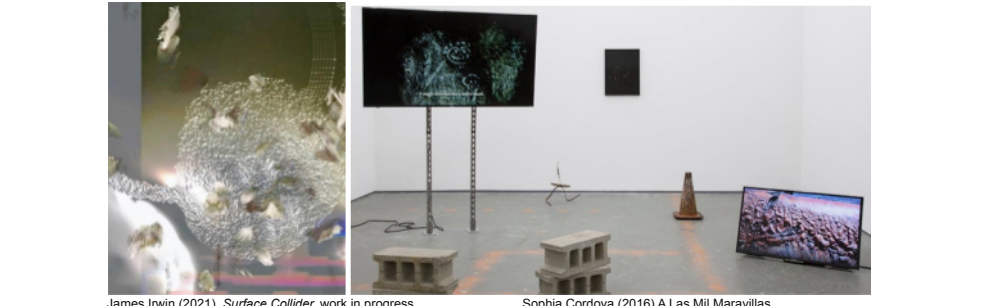
- Useful:
4. Johnny Golding (2021). "The Courage to Matter," in Golding, Reinhart, Paganelli (eds). Data Loam: Sometimes Hard, Usually Soft. (De Gruyter), 450-87. (RR)
5. Michel Foucault (1984) What is Enlightenment? (Berkeley) RR
6. Isabelle Stengers (2014). Gaia, the Urgency to Think (and Feel). [semanticscholar.org/urn:20141111isabelle-stengers-gaia](https://www.semanticscholar.org/urn:20141111isabelle-stengers-gaia)
7. Johnny Golding (2010). "Fractal Philosophy: Trembling on the Plane of Immanence (Attunement as the Task of Art)," in O'Sullivan and Zepke (eds), Deleuze and Contemporary Art, (Routledge), 133-54. (RR)
8. Martin Heidegger (2002 [1959]), Identity and Difference, intro by Joan Stambaugh, (Chicago). (RR)

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Tuesday, 8 Mar
DAY 2: Sense ⇒Intelligence [interspecies communication ⇒storytelling]



'Octopus James Loudon (2021). Octopus Encounter filming Takenouchi Atsushi (2003). Ridden By Nature, dancing Butoh



James Irwin (2021). Surface Collider, work in progress Sophia Cordova (2016) A Las Mil Maravillas.

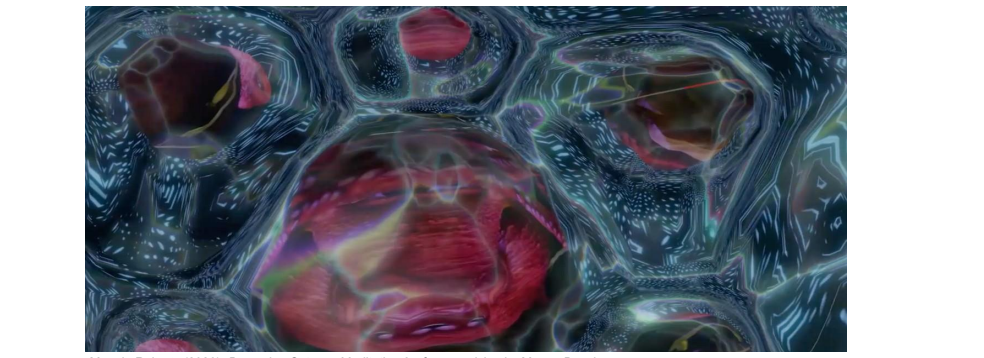
Discussion: Sensualities/Erotics – what does the sexual/ities have to do with radical matter?

Readings/Watchings/Entanglements:

- Core:
1. S. Freud (2019 [1920]), "Part 1: The Psychology of Errors," in his Introductory Lectures of Psychoanalysis, (DigiReads), 9-54. (RR)
2. E.V. de Castro, Relative Native: Essays on Indigenous Conceptual Worlds, (Hau Press) [excerpts] (RR)
3. W. Benjamin (2007 [1955]), "The Story Teller" in Illuminations and Other Essays and Reflections, edited by Hannah Arendt (RR)
4. W. Flusser and L. Bec (2012), Vampyroteuthis-Infernalis: A Treatise, (Minnesota). (RR)
5. E. Grosz (2020), Chaos Territory Art: Deleuze and the Framing of the Earth, (Columbia University). (RR)

- Useful:
1. G. Deleuze and F. Guattari (1987), "Becoming-Intense, Becoming Animal, Becoming Imperceptible..." in A Thousand Plateaus: Capitalism and Schizophrenia, trans by B. Massumi, 272 ff (esp "Memories of a Molecule"...through "Habit") (RR)
2. J. M. Harrison (2002), Light, a science fiction space opera, (Bantam Books). (RR)
3. K. Barad (2014), "Invertebrate Visions. Diffractions of the Britlestar," in Multispecies Salon, edited by Eben Kirksey, (Duke), (RR) multispecies-salon.org/barad/
4. B. J. Robertson (2018), "The New Weird," from None of this is Normal: On the Fiction of Jeff Vandermeer, (Minnesota) (RR)
5. S O'Sullivan, 'Art-practice-as-fictioning-or-myth-science' (Reading Room)

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Maggie Roberts (2020). Becoming Octopus Meditation 8. vfx supervision by Megan Bagshaw

Wednesday, 9 Mar
Day 3: Intelligence ⇒ Skin

Discussion: On unknowing /knowledge systems/ flow/emergence skin as 'ground' / skin as emergence/

]Readings/Watchings/Entanglements:

- Core:
1. D. Haraway (2016), "Introduction," in her Staying with the Trouble: Making Kin in the Chthulucene, (Duke), 1-9. (RR)
2. M. Roberts (2018). OctoGANN a Fiction, (San Francisco, London, Capetown) orphandriftarchive.com/articles/octogann-a-fiction/ (RR)
3. M. Roberts, Hybrid Futures (start at 27 mins): <https://www.youtube.com/watch?v=MnAze91Y-xc>
4. M. Roberts (2020), Polarised Light Vision, The Becoming Octopus Meditations, and ISCR1 animation stills, Interspecies Communication Research Initiative [ISCR1]: A Cephalopod ↔ Machine Encounter. [serpentingalleries.org/arts-technologies/interspecies-communication-research-initiative-iscri-1-a-cephalopod-5e2%86%94-machine-encounter/](https://www.serpentingalleries.org/arts-technologies/interspecies-communication-research-initiative-iscri-1-a-cephalopod-5e2%86%94-machine-encounter/)
5. M. Roberts (2020), The Becoming Octopus Meditations, orphandriftarchive.com/if-all-becoming-octopus-meditations/

- Useful:
6. J. Golding (2022), "Octopussy," first published in Kathy Acker: Get Rid of Meaning edited by Anja Kasser and Matias Viegner, (Verlag der Buchhandlung Walther und Franz König), 359-377 (RR).
7. Orphan Drift (2020), IF A/I/BOHPORTSUALC at vimeo.com/476857017. See also: orphandriftarchive.com/if-all
8. Octopus and squid skins and sucker touch: <https://www.youtube.com/watch?v=M9F6RUsJlMc>

Friday 9 Mar ☐ until RAW
DAY 4 Skin ⇒Dream [making, talking, sharing, debating ARTWORKS in preparation for RAW exhibition

Please note: This is a very intense and intensive approach. You may not be able to keep up with everything – and are certainly not expected to read/watch/witness/touch or play with everything. However, go with it – do your best and let's have a rigorous, fun, wild science, philosophy and art experience! Please also check out work by Maggie Roberts (Orphan Drift website, orphandriftarchive.com/), Sonia Bernac (bernac.org/) who were vital in setting up and delivering this magic carpet ride.

Big love Johnny (London) and Maggie (Cape Town) and Martin (Vienna)





Escaping Auguraculum: on emergent divinations

Sonia Bernac

"The universe was so created that certain results would be preceded by certain signs, which are given sometimes by entrails and by birds, sometimes by lightnings, by portents, and by stars, sometimes by dreams, and sometimes by utterances of persons in a frenzy. And these signs do not often deceive the persons who observe them properly."

Cicero, *On Divination*

A wooden ear, enormous, plugged with cotton and the tediousness of Cicero. What a great stylist, everyone says. Today no one writes such long sentences. And what erudition. He even knows how to read inscriptions on stone. Only never will he guess that the marble veins in the Baths of Diocletian are the blood vessels of slaves which have burst in the quarries.

Zbigniew Herbert, *Classic*

ex avibus [from birds]

The ancient practice of augury - divinations performed by means of birds - could be easily romanticised and hence, misunderstood as a moment of resonance between the collectively conceptualised 'ancients' and nature, cosmos, future. "Taking the auspices" was based on the collection and interpretation of various bird-related incidents and patterns: aerial murmurations; mating songs; the sudden appearance of members of particular species; their unusual behaviour or the order of their actions. Undoubtedly, there is something seductive about the image of a collective movement of eyeballs, human or otherwise, attuned, temporarily suspended from their own daily trajectories, tracing the birds' erratic undulations.

Thomas Nail, in his reading of ancient poet Lucretius' kinetic materialism, notices that the swerve of swallows chasing insects in the air is an expression of the pedetic motion of matter. That is, Nail rightly claims that motion so often perceived as random is, in fact, based on localised interactions that can/must include causality. However, Nail's interpretation of causality does not presuppose some overarching rational logic of motion: instead, causality is simply matter responding to/sensing itself:

Wisdom. Swallows are also known for being prophetic birds. [...] Lucretius does not invoke augury because he believes in prophecy, but because he believes bird movements tell us something about nature, the weather, and so on (which they do).¹



Fig. 02

This image also tethers Nail's argument to a particular kind of nostalgia — since it not only points to alternative ways of knowing that do not presuppose a centralised, anthropocentric Reason - God thrusting meaning into things, or some other universal authority of (Western) Idea - but also subtly suggests (a return to) some pre-rationalist or otherwise spiritual unity of Man with Nature.

In fact, ancient augury was a highly exclusive practice performed only by the chosen, usually in a ritualised space of the Auguraculum, a roofless temple, from which only a section of sky was visible. The positions of birds were marked with stones on the floor at very particular times of day. Until 300 BCE only patricians were permitted to take auspices and even the augurs of noble birth were not allowed to interpret their omens. The role of augurs was only to

perform a rite of accurate prophetic measurement: observation. The honour of interpretation was then reserved for the highest elected political office - the consuls, who would read the obscure clues for use in political navigation.² In that sense, augury was an important part of a highly hierarchical ancient theatre of Politics, which preceded all important public events, elections, legislative decisions, and the declaration of war. Indeed, the word 'inauguration' marking the introductory phase of an event, comes from this ancient divinatory practice, which is not to claim that any etymological or structuralist analysis can ever reveal too much about the subject of the philosophical investigation.

ex tripudiis [from dancing]

Cicero, an augur himself, in his dialogue, *On Divinations*, mentions other types of augury practices that did not always require for birds to fly or to remain alive. For example, a change in appetite or behaviour of sacred chickens, a practice somewhat mysteriously named "the dance", could easily lead to the postponement of a battle.³ A more violent example, such as the respected tradition of haruspicy, required a careful examination of a sacrificed animal's entrails for the minuscule patterns or gut irregularities which enabled a prediction of the future, at least for those beings who survived the ritual.

Although the ancient's reliance on haruspicy for accurate predictions might seem scientifically laughable today, it could be claimed that the custom is not so different from Western practices of the 19th century, or even, those contemporary systems of invention/discovery. Knowing through taking apart: the processes of naming, identifying common features and declaring them universally applicable has a long historical trajectory.

However, the purpose of this brief contextualisation of bird watching is not to provide a historical trajectory of human interest in murmurations. It is rather to distinguish between those who were authorised to look (up) and formulate careful predictions based on omens (elected men of noble birth), those who remained voyeuristic usurpers offending the Gods with their unworthy peering into the future (all other people, including slaves and women), and those who served as a - singular or collective - body/flesh/data for prophetic scrutiny (animals). However, it is not particularly insightful, especially after Foucault, to claim that knowledge is not separable from power structures, or more accurately, the (circulation of) matter of its time.⁴ Ways of seeing, sensing and predicting are always wrapped in a codified economy of future telling-plotting-modelling-fictioning-making. In fact, this "wrapping" does not go far enough to convey the depth of this inseparability, since it implies a form of contextualisation (a stage), and therefore separation between the matrix (spacetime) of power relations and those impressionable subjects, objects and practices stuck in the net of historical dependencies and inequalities.

ex avibus et apibus [from birds and bees]

A visual requisite, frequent example, and one would dare to say: a *symbol* of the current turn to complexity in sciences are the birds and the bees: the murmuration and the beehive. Approaches to systemic complexity vary depending on discipline however there remains certain recurring features which characterise it as a *phenomenon* or *principle* of systemic ordering.⁵ Those associated qualities include: nonlinearity, self-organisation (spontaneous order), the fact that the properties of the delineated collection are not a sum of its constituents — emergence, so called "adaptability", coherence based on feedback loops, non-deterministic behaviour and some relation to what is inaccurately defined as 'randomness' or

'unpredictability'. It is crucial to mention here that those features are not logically parallel but rather interdependent and have their own consequences for systemic prediction making — future telling.

Complex systems, contrary to their name, do not have to be very complicated to self-organise in line with the principles of complexity. Rather, complexity refers to the impossibility of universal scalability of local structural and functional forms of ordering. In that sense, complexity *could* be seen as a counterpoise to the reductionist approach that is based on the assumption that the grammar of a larger system can be expressed in terms of its microscopic components. The opposition between the reductionism and emergence is not, however, a conflict of scale (small for reductionist versus big/broad for emergence) but rather a disbelief (or distrust) in the possibility of absolute ontological scalability.

That point is thoroughly and subtly developed by Laughlin in his book *A Different Universe: Reinventing Physics from the Bottom Down*. Laughlin writes of the investigation of physical fundamentality that historically in the sciences has always been associated with some form of universal law, discovered through investigation performed in microscopic scales. For Laughlin, all laws have "collective origins" by which he means that fundamentality is an emergent property.

In other words, the distinction between fundamental laws and the laws descending from them is a myth, as is the idea of mastery of the universe through mathematics alone. Physical law cannot generally be anticipated by pure thought, but must be discovered experimentally, because control of nature is achieved only when nature allows this through a principle of organization.⁶

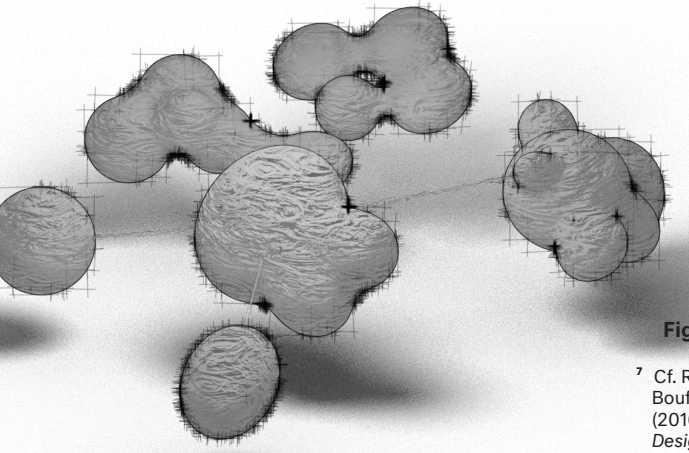


Fig. 07

ex finitimis [from neighbours]

In a simple textbook differentiation, dynamic systems are usually characterised as either *conservative* or *dissipative*. In conservative systems the total energy is preserved, and their processes are considered reversible. Critically, swarms/murmurations (which I will temporarily use interchangeably) are classified as open and dissipative non-equilibrium systems. These dissipative systems operate sometimes far from thermodynamic equilibrium, and exchange energy and matter with the environment. These systems are associated with processes that are irreversible.⁷

There is no underlying theory, formula or model that may predict with certainty the motions of multimodal dynamic groups such as birds, bees and swallows. A variety of methods have been applied to approximate and simulate behaviour of such animal groups, or more broadly "active matter systems",⁸ but although some of them are useful for formulating accurate predictions or convincing simulations, it does not mean that they are necessarily "correct".⁹ For example, even though swarms are non-equilibrium systems, the formalism of phase transition taken from the theory of equilibrium systems often helps to model the collective motion of swarms very accurately. However, the theory of equilibrium systems cannot explain many other important behaviours, for

⁷ Cf. Roland Bouffanais (2016), *Design and Control of Swarm Dynamics*, 1st ed. 2016 edition (Singapore: Springer), 37.

⁸ Active matter systems consist of units that consume energy and generate force, driving emergent dynamic properties on larger scales. Cf. Moumita Das, Christoph F. Schmidt and Michael Murrell (2020) "Introduction to Active Matter," *Soft Matter*, 16, no. 31, 7185–90, doi: [org/10.1039/D0SM01377G](https://doi.org/10.1039/D0SM01377G).

⁹ Cf. Bruno Latour (2010), *On the Modern Cult of the Factish Gods*, (Durham, NC: Duke University Press, 2010).

⁶ Robert Laughlin (2006), *A Different Universe: Reinventing Physics from the Bottom Down*, (New York: Basic Books), 17.

example, the self-organisation of a critical state that does not seem to depend on the change of externally controlled parameters.

The emergence of large-scale order in swarms is linked to local interactions between the agents but should not be considered as emerging *from* it. In bird murmurations - sticking with the most common avian example - a singular agent makes on average six to eight connections (with its seven nearest neighbours). Those connections are adaptive and dynamic, implying constant shifts, changes and fluctuations. The links between group members are not metric but topological, which means that the selection of "neighbours" is not dictated solely by the distance but through the topological convenience and arbitrary rules of attraction. That non-metric convenience is conditioned by the position of the agent in the overarching shape and folding of the topological transformation of the murmuration. Neighbours are also selected based on similarities in speed, size and direction, as well as scientifically arbitrary parameters, such as long-term affiliations that one could dare to call "friendships".¹⁰

All those fascinating dependencies were discovered through the use of stereometry, dynamic 3D modelling and behavioural experiments, during which some of the flocking birds were caught in a net-trap suspended in the air and removed from the murmuration. Researchers then scrutinized how the remaining group dealt with the loss and what it meant for the local interactions. In fact, the sudden disappearance of a frequently contacted group member led to increased socialising of the abandoned agents.¹¹ Hence we can surmise that a turn to biomimicry in the sciences is not necessarily tantamount to compassion.

When formalising, conceptualising and modelling swarms, ample focus is placed on mapping those instabilities that might lead to chaotic behaviour. Contrary to the common-sense meaning, this "chaos" does not equate to mess or absolute disorder but rather acute sensitivity to initial conditions, the so-called "butterfly effect". More interestingly, within the observation of apparent order formations in murmurations, one could mistakenly conclude that formulation of the patterns of order is always immediately perceptible. However, there are many forms of order, such as the periodicity of movement that only reveals self-similarity of apparent incidents and irregularities over long periods of time. Alignment, change of direction and the re-coupling of agents that can be visually observed are only a small part of the murmured pulsations emerging through the movement. Indeed, complexity scientist Roland

ex chaos [from chaos]

Plato's *Republic* makes frequent use of the rhetoric of divination to suggest ways of accessing transcendental knowledge of the Good. For Plato "they rectified the vile part in us by establishing divination there, so that it might in some degree lay hold of the truth".¹² Divining for Plato is a way of intuiting without constructing an analytical proof, since what is being summoned is the already existing Idea (of Forms). In Plato's language of systems and predictions, the future trajectory is neither known or knowable, yet it already exists in some metaphysical and inaccessible form.¹³

A very different divinatory logic is presented by Lucretius in *On the Nature of Things*, where divinatory do not serve to summon some metaphysical readymade, but are themselves a part of the ongoing and indeterminate motion of matter driven by microscopic (inter)actions, micro-causalities, resonances, fluctuating attractions of patterning, etc.

When formalising, conceptualising and modelling swarms, ample focus is placed on mapping those instabilities that might lead to chaotic behaviour. Contrary to the common-sense meaning, this "chaos" does not equate to mess or absolute disorder but rather acute sensitivity to initial conditions, the so-called "butterfly effect". More interestingly, within the observation of apparent order formations in murmurations, one could mistakenly conclude that formulation of the patterns of order is always immediately perceptible. However, there are many forms of order, such as the periodicity of movement that only reveals self-similarity of apparent incidents and irregularities over long periods of time. Alignment, change of direction and the re-coupling of agents that can be visually observed are only a small part of the murmured pulsations emerging through the movement. Indeed, complexity scientist Roland

¹⁰ Roland Bouffanais does not mention friendships. Roland Bouffanais (2016) [2015], *Design and Control of Swarm Dynamics*, (Singapore: Springer).

¹¹ Josh A. Firth et al (2017), "Wild Birds Respond to Flockmate Loss by Increasing Their Social Network Associations to Others", *Proceedings of the Royal Society B: Biological Sciences* 284, no. 1854, 20170299, doi: [org/10.1098/rspb.2017.0299](https://doi.org/10.1098/rspb.2017.0299).

¹² Plato (nd), *The Republic*, edited by Melissa Lane (2007), trans. H. D. P. Lee and Desmond Lee, (Penguin Classics).

¹³ Peter Struck (2014), "Plato and Divination," *Archiv Für Religionsgeschichte* 15, no. 1 (March 2014): 17–34, doi: [org/10.1515/arege-2013-0003](https://doi.org/10.1515/arege-2013-0003).

¹⁴ Bouffanais, *Design and Control of Swarm Dynamics*.

¹⁵ This term was first coined by Norman H. Packard in his *Adaptation Toward the Edge of Chaos*. Norman H. Packard (1988), *Adaptation Toward the Edge of Chaos*, (University of Illinois at Urbana-Champaign, Center for Complex Systems Research).

Bouffanais mentions a fascinating case of turbulent flows, which might ocularly appear as lacking order. However, the analysis of these flows reveals the emergence of large-scale coherent structures associated with fluctuations of the velocity field.¹⁴

Consequently, the emergence of a pattern is dynamic, but not just in the sense that such a pattern might transform *in* time. In fact, every entity perpetually emerges through different forms of patterning and feedback (cohering). As such, the same material arrangement/property might act as a similarity *and* difference, depending on the systemic cohering order operating in various fluctuations, which are of the same time and yet of different spatiotemporal periodicities. Moreover, the same "part" might partake in different scales and ranges of order. The key to grasping this strange plurality is hence not through ocular means but by way of sound and rhythm. [Fig. 01]

Furthermore, collective adaptive systems are often characterised as existing "at the edge of chaos".¹⁵ This dramatic (and rather annoying) statement implies that these systems are close to criticality. In statistical physics, criticality or a critical point (on a phase diagram, for example) is a state separating an ordered phase from a disordered phase. This is a very important point, since if the system was too "ordered" it would be very difficult for its avian agents to break down their ritualised choreography quickly enough to react to the fast-changing conditions (of the environment). If the system was too "disordered",

Fig. 01

the change in insufficiently correlated agents would be too slow and would fail to utilise the collective matter (and force) of the group efficiently. However, at a critical point, thanks to long-range correlations, the swarms can react quickly, efficiently and in the emergent collective interest. For example, by avoiding the danger of a predator through a confusing wavering of the collective body, or by reacting to the increased noise of stormy weather with tighter distances between the agents.

Fluctuations and oscillations of the systems should not be seen as "glitches" or irregularities of the overarching pattern of order. Crucially, they are not dirt or excess but important factors in the system's ongoing coherence. They not only push the system closer to criticality, but act as a cohering force in response to the noise and perturbations of the environment.

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of the *environment* that clumsily keeps returning to the argument is not as innocent as it seems, even with the assumption of fuzzy, blurry edges of anything. The distributed multimodal systems, and matter in general are often wrongly thought of as some sliced up, dispersed oneness consisting of many moving parts, or slightly more subtly, but also incorrectly, as a complementary dance of continuousness and discreteness. The swallows of Lucretius might be helpful in understanding this problem from

a slightly different angle than the already criticised notion of the contextual "stage".

Swallows are known above all for their chaotic and unpredictable flight paths as they hunt insects in mid-air. (...) Since humans cannot see these insects, it looks as though the swallows are moving 'randomly', when in fact their erratic-looking movements are the result of a highly relational and responsive entanglement with their prey.¹⁶

What this passage in Nail's book serves to illustrate is the fact the system of birds observed from the ground is linked to another (less-perceptible) murmuration of midges which might in turn be more closely interacting with another complex system. That thickening topology of links should not be imagined as a growing network of (trophic) dependencies or a tangle of clusters of same-species/same-material /same-tribe aggregations symbiotically influencing each other. Those local and non-local resonances have little to do with the apparent edges of bodies or ocularly perceived similarities. Hence, the patterning and feedback (loops) do not happen just within the boundaries of one thing (either distributed or seemingly centralised) but act as intersectional processes of coherence - resonance operating in different ranges/ dimensions/ phases of matter.



Fig. 03

Johnny Golding talks about those thickening topologies as a form of camouflage, a return of similarity and, more importantly, difference that sets up the fabric of meaning. In earlier work by Golding, it is observed that this camouflage can to some extent be expressed by the Mandelbrot set equation $Z = Z^2 + C$, where the recursive fractal patterns enable expansion—a thickening of "any given 'Z'".¹⁷ This is, of course, not just a mathematical proposition as this "thickening" is an ontological move that speaks directly to circulation, a particular kind of dynamic folding and weaving.¹⁸ Those should not be considered as metaphors or analogies but powerful images that enable thinking through different aspects of mattering.

In the light of all certain features mentioned earlier and a few comments on causality, one could mistakenly reach a conclusion that the motion of matter is at heart driven by utilitarian deterministic actions and therefore can be accurately predicted/divined (with only some minor embellishment of teleologically driven fluctuations).

The indeterminate nature of motion does not mean that it is incalculable, hard to predict or model, or that the most efficient tools for prognostication have not yet been invented. Undoubtedly, there is plenty to discover and invent about complex adaptive systems and their artificial doppelgängers. The uncertainty in question does not mean that the material world is mysteriously unknowable or otherwise impenetrable, which would be repeating the mistake of Object-Oriented Ontology (by injecting matter with some essentialist secret). Undecidability means that, in principle, the future of a system, to stick with the rhetoric of divinations, is not deducible or reducible from its initial conditions. Gödel's theorem makes it

¹⁶ Nail, Lucretius II: An Ethics of Motion, p.22.

¹⁷ Johnny Golding (2012), "Ana-Materialism and the Pineal Eye: Becoming Mouth-Breast (or Visual Arts After Descartes, Bataille, Butler, Deleuze and Synthesis with an 'S')", *Philosophy of Photography* 3, no. 1, 99-120. doi.org/10.1386/pop.3.1.99.1.

¹⁸ Cf. Thomas Nail (2018), *Lucretius I: An Ontology of Motion* (Edinburgh: Edinburgh University Press).

¹⁹ Kurt Gödel (2012), *On Formally Undecidable Propositions of Principia Mathematica and Related Systems* (Dover Publications).

²⁰ Wendy Hui Kyong Chun (2021), *Discriminating Data: Correlation, Neighborhoods, and the New Politics of Recognition* (Cambridge, Massachusetts: MIT Press).

²¹ Gerald Nestler (2016), *The Derivative Condition. A Present Inquiry into the History of Futures* (Goldsmiths University of London Ph.D. submission in Research Architecture).

²² I am indebted to a researcher and artist John Wild for this phrase in the context of generative AI.

²³ Pierre-Simon Laplace (2011), *Philosophical Essay on Probabilities*, Reprint of the original 1st ed. 1995 edition (New York: Springer).

formally apparent that any totalising consistency is not expressible through the original axioms of the system.¹⁹ Even though every system is fundamentally undecidable, complex adaptive aggregations with their leaping, re-coupling, phase-shifting and re-ordering without any help from external parameters (or God) make the non-deterministic logics of motion pleasantly palpable.

It seems important to mention here that contemporary interest in complexity is not driven solely by philosophical curiosity but by practical interest in very specific features (of multimodal adaptive systems in particular) that are invaluable for design: adaptability, flexibility and robustness. However, the study of these organisational phenomena in systems does not necessarily imply the emergence of a new method or methodology. In other words, as long as complexity and emergence are still approached as *subjects*, making predictions (divining the not yet known) will continue to resonate with the already existing structures of knowledge/power, and with the patterns of exclusion and oppression. Herbert's post-war poetry (cited at the start of this paper), so often critical of the partial view and idealisation of antiquity, features traces and signs that refer to slavery as a part of the economy of classical thought. For Herbert, the "marble veins in the Baths of Diocletian" are a form of "seeing" the patterns of classical violence, so often overlooked in contemporary references to ancient thinkers. Without a rigorous scrutiny towards scientific methodologies and their politics, our contemporary fascination with distributed complex systems will result in a repetition of the same mistakes.

To be more specific, Wendy Chun in *Discriminating Data* draws attention to ways in which the methods of network theory abstract complex systems of relationships. She divides this process into two stages: the first implies conceptualising bundles of things

as agents and relationships which requires a division of phenomena into static "nodes" and "edges". The second stage is more mathematical, by producing an abstraction of that data into a reproducible model used to design social interactions in the present/future.²⁰ This is also put rather elegantly in Gerard Nestler's work on the Derivative Condition, where futures modelled on the biased past render any true change impossible.²¹ To phrase this differently, it is a process of forcing matter into a controllable and malleable determinism or range of probabilities, in which undecidability is simulated with the parameters of randomness.

This opens up a much broader question in machine learning and forms of, so called, artificial intelligence. In many ways AI can be considered as the ultimate "prophecy machine".²² It could seem that the Laplace demon, anticipating transcendence to qubits, but already with enough computing power, is already capable of uncannily accurate simulations.

An intellect which at a certain moment would know all forces that set nature in motion, and all positions of all items of which nature is composed, if this intellect were also vast enough to submit these data to analysis, it would embrace in a single formula the movements of the greatest bodies of the universe and those of the tiniest atom; for such an intellect nothing would be uncertain and the future just like the past would be present before its eyes.²³

That *simulation* does not have to have the aesthetics of ancient prophecy. In many ways any generative AI tool trained on databases but capable of prompt-induced or spontaneous creation follows a prophetic model: scanning for recurring or *significant* elements, detecting patterns-models, generating

²⁴ I am aware that the language used here might suggest forms of intentionality. The generative process mentioned here is referencing GANs: Generative Adversarial Networks, but there are, of course, many other forms of generative AI.

²⁵ Johnny Golding (2010), "Fractal Philosophy: Attunement as the Task of Art", edited by Stephen Zepke and Simon O'Sullivan (Edinburgh: Edinburgh University Press), 133-54. edinburghuniversitypress.com/book-deleuze-and-contemporary-art.html.

something that feels like it *belongs* to that systemic whole, and trying to pass that through the adversarial network.²⁴

The question is not if those generated entities are new enough, or *truly* emergent. As mentioned before, any system, even that thriving on the illusion of total determinism is always already to some extent undecidable. The question is rather, to what extent that undecidability, even understood narrowly as a possibility of a logical leap, is nurtured within the systemic logic, and not simply exploited in a form of artificially induced randomness or identified as a glitch.

The discovery of emergence in complex systems therefore requires the symbiotic invention of truly interdisciplinary emergent methodologies. Such methodologies, based on generative, experimental, explorative and reflexive praxis must embrace undecidability not as incalculable probability but as a necessary condition for knowing, making, and predicting. Hence, the future is not summoned or calculated based on initial conditions but collectively invented-fictioned through the local and non-local interactions between conscious and non-conscious agents.

The birds, whether dead or alive, have no rehearsed messages to pass on. The method of emergence is a practice of plural divinations that does not presuppose prior or hidden meaning, nor imply the presence of a pattern that must be traced/caught/retrieved and made subject to interpretation. In fact, divination does not seem to be possible without what Golding calls *attunement*, a particular kind of listening-sensing that betrays any understanding of sterile one-sidedness.²⁵ This move would only be possible through some kind of experimental poetics (art), where artistic methodology functions as a form of attuned, emergent divination. Fig. 02, 03, 04

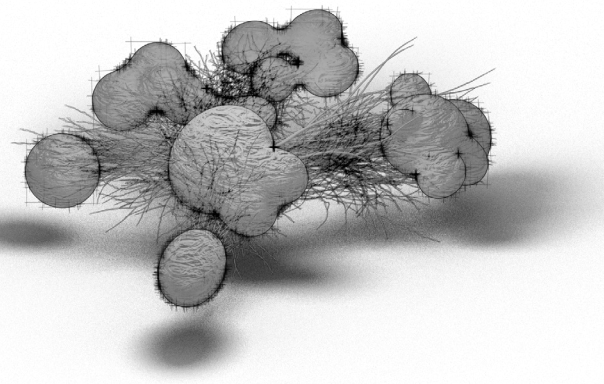


Fig. 04

Fig. 01 Simulation of a particle aggregation in Blender showing different ranges of cohesion. The swarm temporarily splits into three parts, in which interactions are regulated by attraction and cohesion avoidance. The sections periodically cohere into one, to split again forming new waves.

Fig. 02 The initial diagrams show the shortcomings of modelling of dependencies in the complex adaptive systems as a static network with uniformly defined vortices and edges.

The diagrams (Fig. 03, Fig. 04, Fig. 05) propose a step towards mapping the emergent topologies in complex systems. The connections between vertices (edges) are presented as wave/weave of possibilities that reveal vertex-like properties themselves. The hierarchical dependency between a thing and a connection between agents gets destabilised. Similarly, the previously uniform vertices grow and expand (based on dynamic changes and clustering of agents).

The "flaking" visible across the diagram marks the moments of breaking off, the irregularities of a system start forming a new pattern-topology. In the structure of graph theory it could be considered as edgelessness.

Leftovers (Fig. 06, 07)

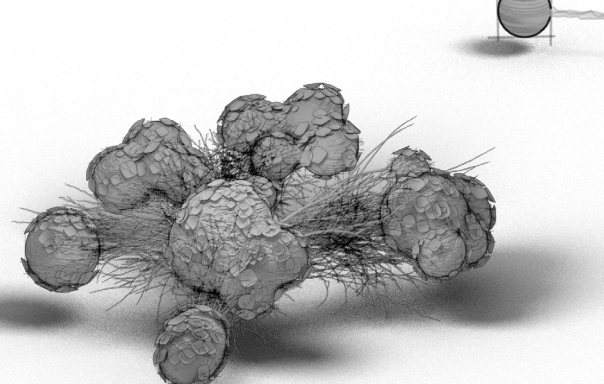


Fig. 05

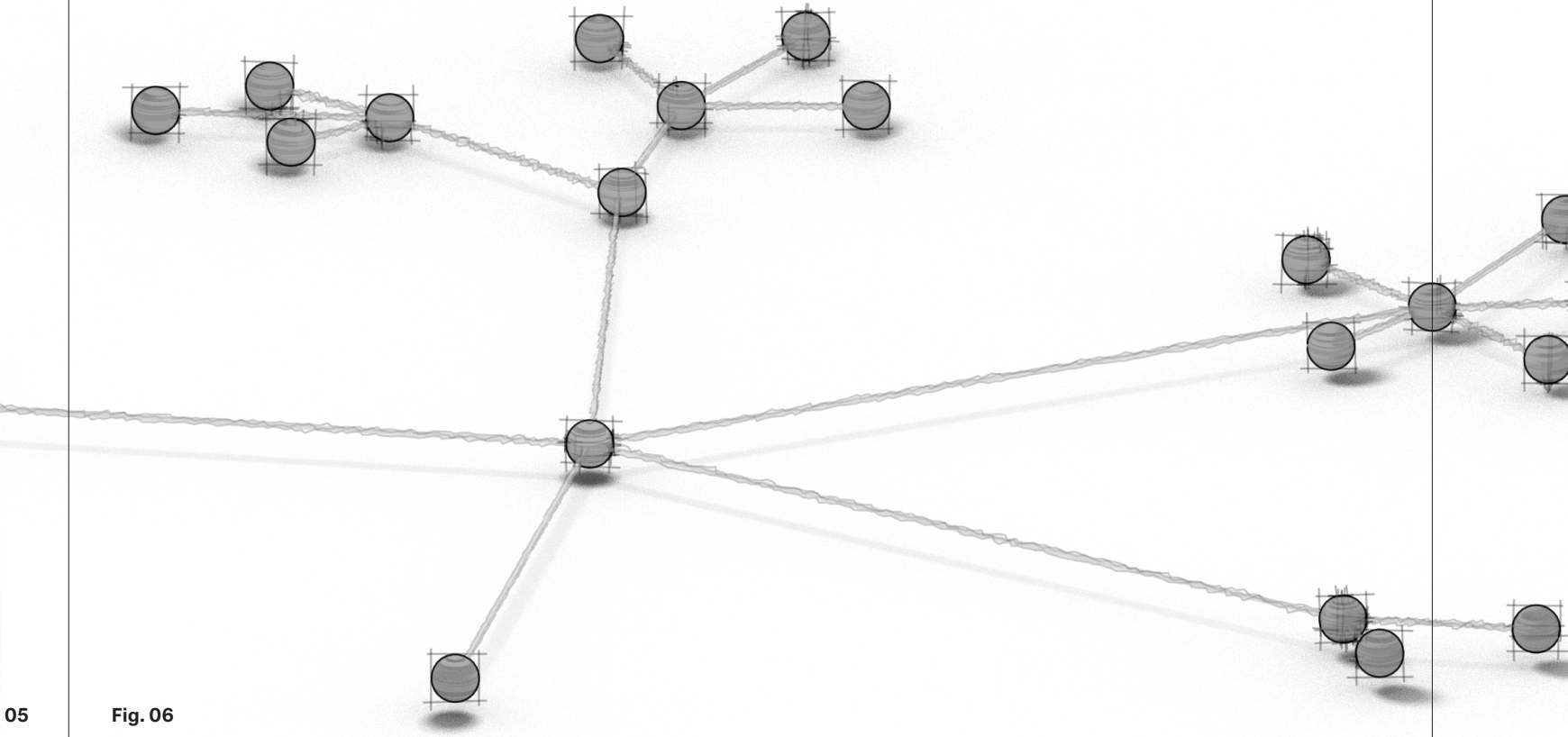


Fig. 06

```
//Leap
Pdef(\DSP, Pbind(
  \instrument, Pxrnd(-dsp, inf).trace,
  \group, ~prc,
  \addAction, \addTail,
  \inBus, Pfunc{(((-lvl * 10000) % 1.0).range(2,5).round)},
  \outBus, Pfunc{(((-lvl * 15000) % 1.0).range(2,5).round)},
  \modFreq, Pfunc{(((-lvl * 10000) % 1.0).range(0.1,3))},
  \modRate, Pfunc{(((-lvl * 10000) % 1.0).range(0.0001,0.05))},
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  \res, Pfunc{(((-lvl * 10000) % 1.0).range(0.1,0.8))},
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    36, ((-lvl * 10000) % 1.0).range(3,8))},
  \filtType, Pfunc{(((-lvl * 10000) % 1.0).range(0,2).round)},
  \decayTime, Pfunc{(((-lvl * 10000) % 1.0).range(0.001,0.1))},
  \decay, Pfunc{(((-lvl * 10000) % 1.0).range(0.2,0.85))},
  \delTime, Pfunc{(((-lvl * 10000) % 1.0).range(0.1,2))},
  \fbk, Pfunc{(((-lvl * 10000) % 1.0).range(0.1,0.7))},
  \curve, Pfunc{(((-lvl * 10000) % 1.0).range(-1,1))},
  \shift, Pfunc{(((-lvl * 10000) % 1.0).range(-128,128))},
  \numFrames, Pfunc{(((-lvl * 10000) % 1.0).range(10,128))},
  \phase, Pfunc{(((-lvl * 10000) % 1.0).range(-1,1))},
  \teeth, Pfunc{(((-lvl * 10000) % 1.0).range(1,24))},
  \width, Pfunc{(((-lvl * 10000) % 1.0).range(0.1,0.9))},
  \wipe, Pfunc{(((-lvl * 10000) % 1.0).range(0.1,0.9))},
  \bwr, Pfunc{(((-lvl * 10000) % 1.0).range(0.1,5))},
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  \real, Pfunc{(((-lvl * 10000) % 1.0).range(-1,1))},
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  \threshold, Pfunc{(((-lvl * 10000) % 1.0).range(0.1,5))},
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  \band, Pfunc{(((-lvl * 10000) % 1.0).range(0.1,0.4))},
  \high, Pfunc{(((-lvl * 10000) % 1.0).range(0.1,0.4))},
  \notch, Pfunc{(((-lvl * 10000) % 1.0).range(0.1,0.4))},
  \peak, Pfunc{(((-lvl * 10000) % 1.0).range(0.1,0.4))},
  \timeFac, Pfunc{(((-lvl * 10000) % 1.0).range(0.5,2))},
  \atk, Pfunc{(((-lvl * 10000) % 1.0).range(5,10))} * Pkey(\timeFac),
  \sus, Pfunc{(((-lvl * 10000) % 1.0).range(20,30))} * Pkey(\timeFac),
  \rel, Pfunc{(((-lvl * 10000) % 1.0).range(5,10))} * Pkey(\timeFac),
  \dur, 20 * Pkey(\timeFac),
  },
  ).play;
};
//emerge
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acute provocations – oblique strategies – queer analogies:

how to trouble categories (manifesto)

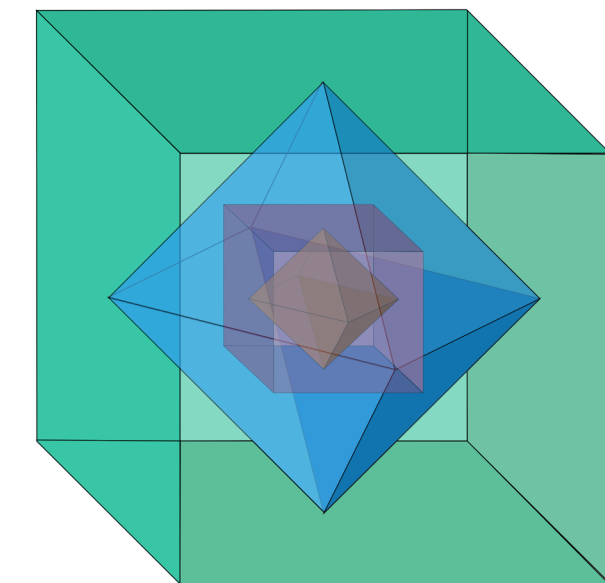
Mukul Patel

Our supposedly algorithmic culture is not a material phenomenon so much as a devotional one, a supplication made to the computers people have allowed to replace gods in their minds [...].

Metanarrative, metanarrative, high time to kick the habit! (Emergence does not imply transcendence).

acute provocation:

Let 'Algorithmic Realm' mean the confluence of networked pervasive sensors, processors and actuators, with 'artificial intelligence' (AI) or automated decision making (ADM) systems, as it intersects with our lives. Here, we are concerned more with self-quantification and network surveillance, recommendation algorithms dispensing credit and justice, machine vision for trucks and warriors – less with winning at



Go or folding proteins.³ This Algorithmic Realm is rooted – radically embedded – in the materialities of mining, refining, and manufacture, of energy transfer and logistics. It is shaped by practices of value extraction, violence to the body and mental slavery; by methods of optimisation, fashions of prediction; it is given form by frameworks of discrimination, languages of regulation, ethical guidelines, the curricula of computer science courses; conventions of individuality and identity are inscribed in it, as are memos issued by the heads of departments of corporate social responsibility.

Algorithms identify and classify (individuals, groups, behaviours, trends), generate and predict; rank, sort, and order (greater than, close to). These processes operate on aggregations and approximations, and are contingent on choices about what constitutes data (figure/ground, signal/noise), what space the data is embedded in, how it is quantified – that is, on underlying mathematical choices. (Mathematics is the art of giving the same name to different things – Henri Poincaré).⁴

Not all algorithms are greedy, but the Algorithmic Realm is.⁵ Optimisation is always local – to the writer of the objective function who defines what is 'good' and what is 'good enough'; to the metric that the function employs and the space in which it lives; to a specific moment – sensitive dependence on initial conditions makes it so.

Imperative: Seek strategies to test and protest technological solutionism. How to trouble categories sedimented by habit? Squint!

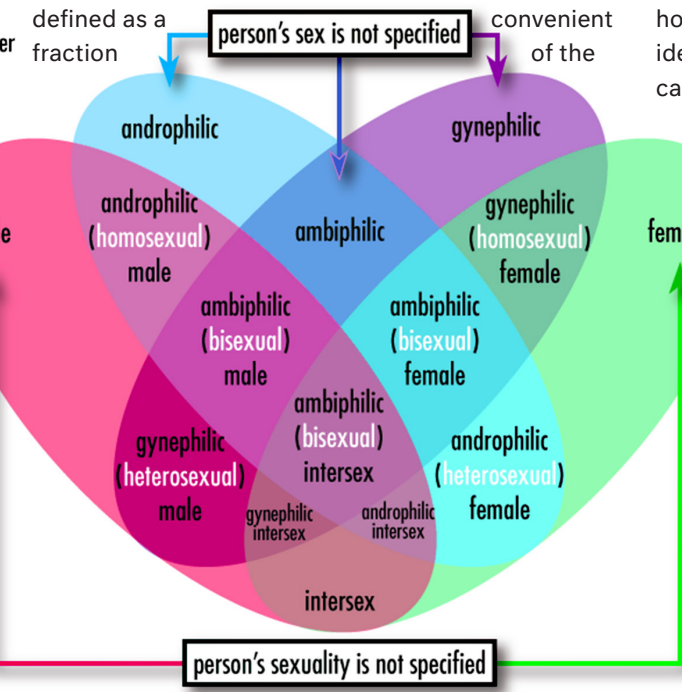
Fig. 01 Dual polyhedra The cube and the octahedron are duals of each other.

oblique strategy: reflect, rotate, translate, invert, evert⁶

Many structures and concepts in mathematics have corresponding 'duals' that are related by well-defined transformations.⁷ The green cube and blue octahedron (Fig. 01) are duals (each face of the cube corresponds to a vertex of the octahedron), as are the blue octahedron and the pink cube. In projective geometry, theorems become their duals if the words 'point' and 'line' are swapped.⁸ Although such transformations preserve structure, the inversions offer different perspectives.

oblique strategy: fix a different variable

A related move is the swapping of figure and ground, which need not be superficial. Consider a quantity (a figure) measured in some arbitrary unit (the ground). Why fix the ground? In 2018, all the base units of S.I. (Système International) were redefined in terms of physical constants.⁹ In theory, universal physical constants such as the speed of light, c, are fixed for all times and places. Historically, numerical values for these constants were obtained through experiment, in units defined with reference to a standard. For example, the metre was originally defined as a fraction



Earth's circumference, and later redefined as the length of a physical artefact – a platinum-iridium bar. But as the resolution of instruments and measuring techniques improved, so variations in the standard artefacts became evident. This prompted a philosophical shift – from fixing standardised units and experimentally measuring the constants, to fixing convenient numerical values for the constants and defining units in terms of them. In 1967, the second was defined in terms of the physical constant ΔVCs, the unperturbed ground-state hyperfine transition frequency of the caesium-133 atom, whose numerical value was fixed to be 9 192 631 770 Hz.¹⁰ Subsequently, c was fixed at 299 792 458 ms⁻¹, thus implicitly defining the metre in terms of two physical constants. Through fixing the numerical values of five other constants, the measurement community effected a total figure-ground reversal.

oblique strategy: extend, reframe, tilt-shift

Queer categories, whenever possible. We may want to hold on fondly to categories that were significant in a personal or socio-political struggle, but once they are co-opted or complicated – reformulate! The androphilic-gynephilic schema (Fig. 02) expands the homosexual-heterosexual one by decoupling gender identity from sexuality – a candidate for more subtle categorisation.¹¹

oblique strategy: look at the bigger problem (it might be more tractable)

"Lichens are places where an organism unravels into an ecosystem and where an ecosystem congeals into an organism. They flicker between 'wholes' and 'collections of parts'."¹² The development of the holistic, relational perspective has transformed microbial ecology, and other sciences.

Fig. 02 Androphilia-gynephilia schema Illustration modified from Alternative graph of sexuality descriptors and gender identities by Jokestress (CC BY-SA 3.0) commons.wikimedia.org/w/index.php?curid=15971920

oblique strategy: process vs. structure

"We have never been individuals."¹³ In his *Queer Theory for Lichens*, David Andrew Griffiths elaborates a symbiotic view that tacks away from the idea of heterosexual reproduction and inheritance as the dominant mechanisms for propagating life, and challenges outright the concept of the individual that we commonly understand as unproblematic. Ecosystems, colonies, microbiomes; organisms within organisms. The individual has been put in question from other perspectives too – from the point of view of the gene, through the idea of embodied cognition, by the death of the author. Griffiths tunes the study of symbiotic lichens to resonate with contemporary issues in sexual politics: "If heteronormativity and sexual reproduction no longer define the frame through which nature is viewed, then this will have an effect on the definition of some social and cultural practices as 'natural'."¹⁴

queer analogy: exchange parts of speech

Categorically, reframe. "Lichens are a product, less of their parts than of the exchanges between those parts. [...] they are verbs as well as nouns."¹⁵

oblique strategy: traverse the whole tree¹⁶

More convoluted shifts are possible. Kay Rosen's *The Forest for the Trees* is a folding of the lexical and the semantic, a visual pun, an outrageous eversion of language.¹⁷ The work consists of a text painting that reads

tthhee ffoorreeesstt in which letters of the phrase 'for the trees' are interleaved with those of 'the forest'. It even rustles like wind through branches. Braid concepts. Translate into another medium – same use (sic). Say music?¹⁸

queer analogy: reverse of the tapestry

Rethink milk.¹⁴ The gut microbiota of breastfed infants is modulated by human milk [...].¹⁹

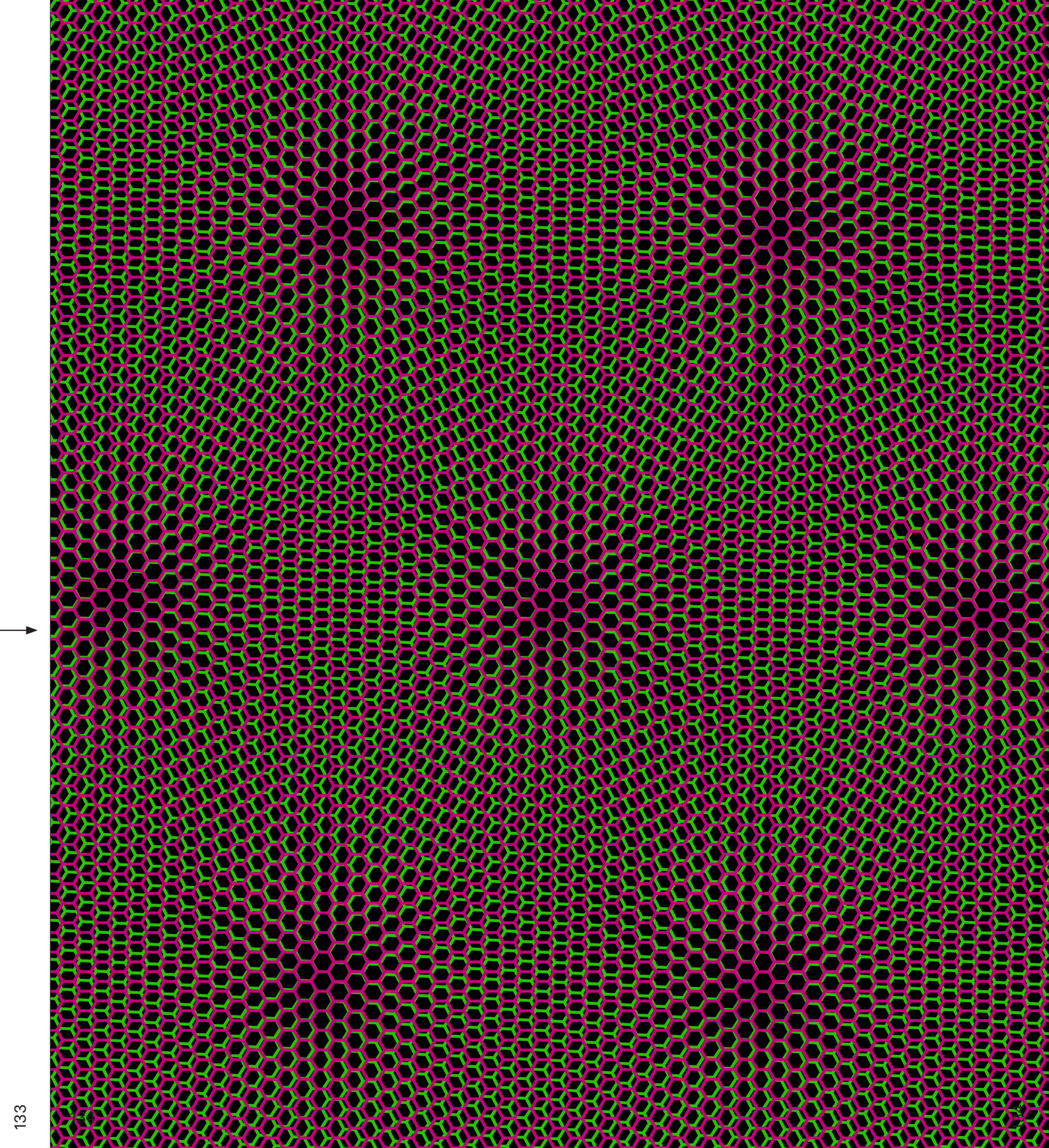
Oligosaccharides, a major constituent of breast milk, are indigestible by the infant, but constitute food for its intestinal *Bifidobacteria infantis* – which produce fatty acids, in turn feeding the gut cells. The microbiologist David Mills 'sees *B. infantis* as part of milk, albeit a part that is not made in the breast'.²⁰ What we once thought of as substance or *matter* produced by mother for infant, we can reframe as a *set of relationships* between mother, infant, and the infant's gut microbiome.

oblique strategy: out of alignment

When two-dimensional lattices (plane tilings) are superimposed and rotated relative to each other, moiré patterns form. In Fig. 03, there are two copies (green and magenta) of a regular hexagonal lattice, with a relative twist of 2.6°. Out of the regularity of the lattices and their interaction emerges a related regularity – the moiré superlattice, with hexagonal structure at a larger scale.

Graphene is an allotrope (specific atomic arrangement) of the element carbon that occurs in sheets of single-atom thinness, with the atoms arranged at the nodes of a regular hexagonal lattice. When two layers of graphene are stacked and rotated relative to each other at a specific angle, the moiré superlattice that forms exhibits properties that neither layer does alone. For graphene sheets twisted at 1.1°, the resulting superlattice of electrons permeates the sheet-pair so that it becomes a superconductor.²¹ At other angles, the graphene acts as an insulator.²² This dramatic variation in conductivity is an emergent phenomenon. If a quantum analogy is a leap too small, consider the autostereogram.²³ Lay out your categories in patterns, repeated and superposed. Defocus and observe the flux – what depths emerge?

Fig. 03 Moiré superlattice Moiré pattern created by rotating two regular hexagonal lattices through a relative angle of 2.6°.



oblique strategy: measure differently

In modelling and algorithm design, mathematical assumptions and choices are inflected by the culture, world-views and mathematical sophistication of system designers, all of which affect data classification, measurement and even (the possibility of) ordering.²⁴ There exist many (possibly infinitely many, depending on context) equally valid and rigorous methods

for computing distance (between points, between numbers), as well as many alternate spaces in which data can be embedded. Is there an obvious 'natural' or canonical metric (distance function) or topology (loosely, how the space is connected) for a model or dataset? (What would it mean for a dataset to have 'natural' structure, unanchored by teleology?)

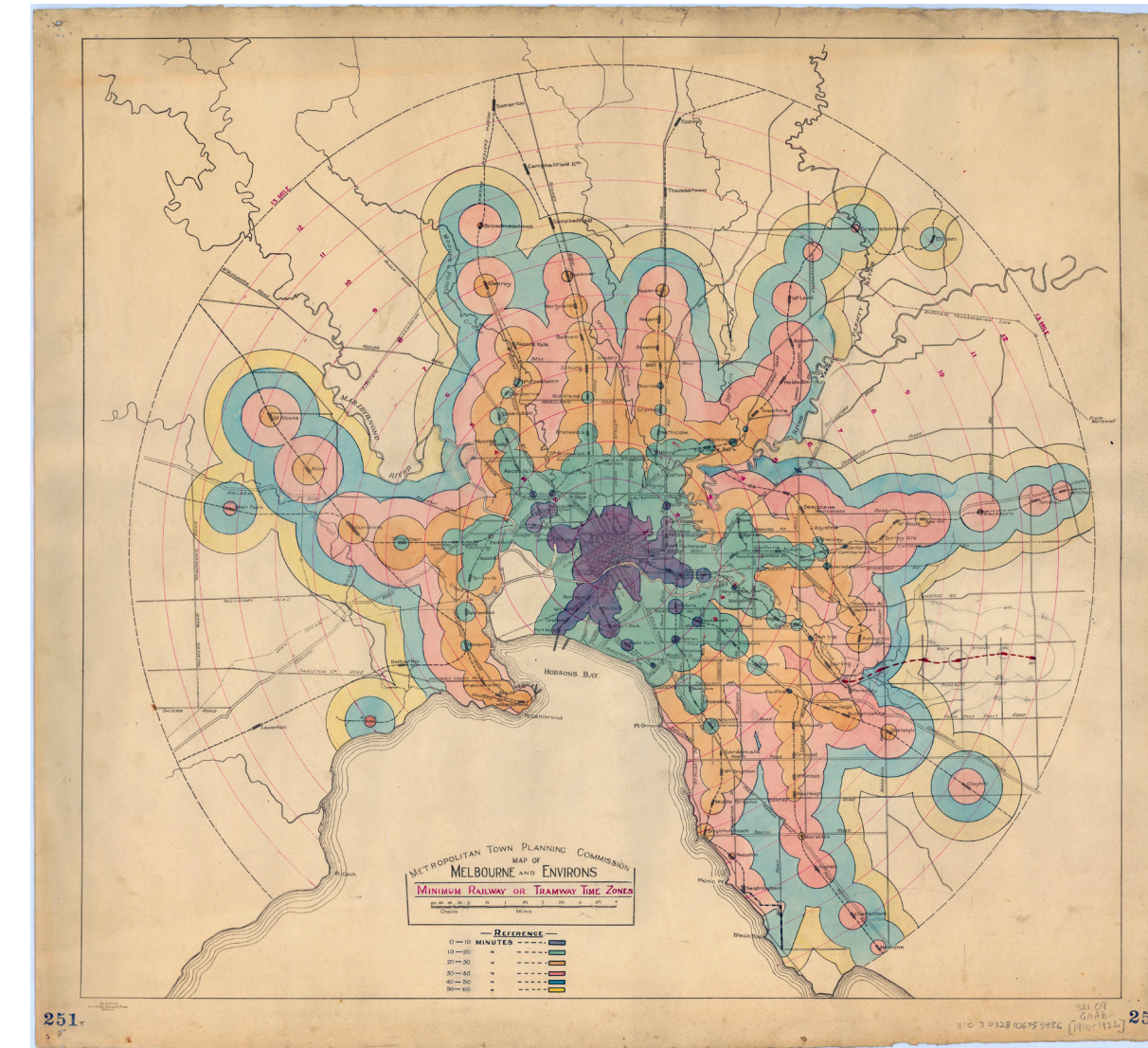


Fig. 04 Melbourne transit isochrone Isochrone map of tram and rail transit times from Melbourne city centre, c. 1910-1922. Courtesy of Melbourne and Metropolitan Tramways Board and the State Library of Victoria (public domain)

For inhabitants of grid-plan cities (for example: Manhattan), the 'taxicab metric' – along streets and up avenues – yields a more useful notion of distance than the normal Euclidean function, that is, the direct path 'as the crow flies'. An even better metric for commuters is 'travel time': the isochrone map for Melbourne's rail system (Fig. 04) uses colour to depict (temporal) distance to the centre. A different isochrone map would hold for travel by road, and for wheelchair and baby buggy users, factors such as pavement surface, street furniture, kerbs and ramps would further skew the map. Urban planning is urban planning *relative to a metric*.²⁵

Another distance function, the Hamming distance, is the symbol-wise difference between two strings of identical length. The strings '1000' and '1001' have Hamming distance one, because they differ in one symbol; 'fair' and 'foul' have Hamming distance three; 'oversight' (noun form of 'overseeing') and 'oversight' (noun form of 'overlooking') have Hamming distance zero – though semantically they are opposites. Which distance function is appropriate when comparing highly abstract or composite data, such as individual credit scores?

LEFT ————— RIGHT

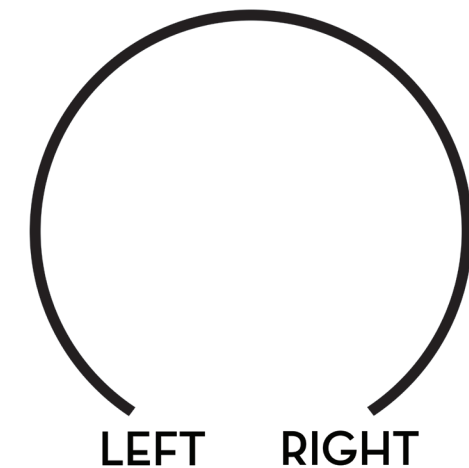
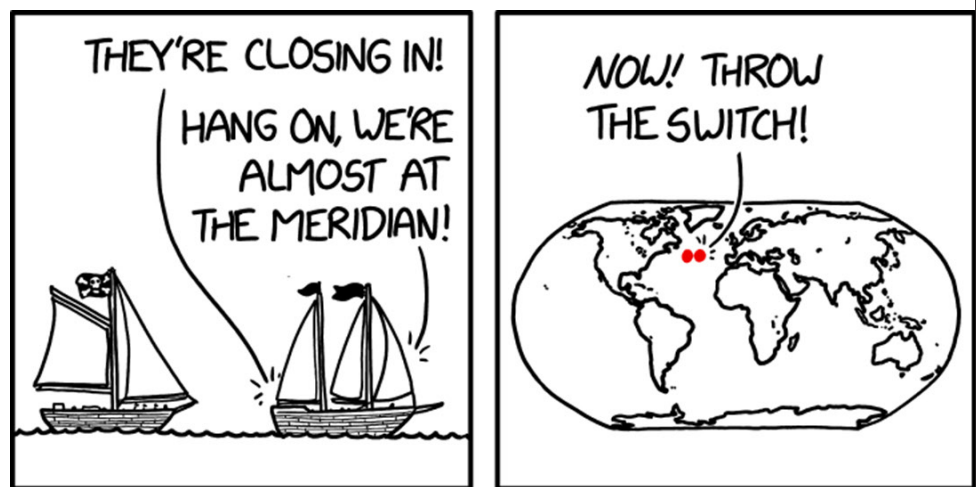


Fig. 05
One dimension, two embeddings
Embedding the same data in different spaces suggests different relationships.

oblique strategy: measure differently (differently)
How big is the number five? The obvious answer is of course correct ('five', or 'one more than four'). Formally, the size of a number is captured by its absolute value. By a theorem due to Ostrowski (1916), there exist equally valid definitions of absolute value other than the usual (Archimedean) one; these are the *p-adic* absolute values, which can be defined for every prime number *p*.²⁶ The *p-adic* absolute value of a number captures information about how divisible it is by *p*, such that numbers that are highly divisible are relatively small. For example, in 3-adic arithmetic, 3 and 81 are both quite small, while 4 is large (and hence much further away from 3 than 81 is). The provocation advanced here is that the choice of the usual Archimedean absolute value over a *p-adic* one is arbitrary, and requires contextual justification – just as a choice of metric or topology does.

Fig. 06
Sea Chase: emergency projection switch
Points that are neighbours under one projection may be distant under another.
Sea Chase by Randall Munroe / xkcd (CC BY-NC 2.5)
xkcd.com/2577/



oblique strategy: try another space (spherical, toroidal, hyperbolic...)
The space that data is embedded in can also dramatically affect interpretation. A naive, one-dimensional plot of political affiliation (left wing – right wing) suggests very different relationships between extreme positions depending on whether it is embedded in a line segment or in an arc (Fig. 05). The choice of a particular map projection can mean the difference between life and death (Fig. 06).



queer analogy: read the bag, not the contents
Topologically distinct spaces are connected differently, and the same data embedded in different spaces may exhibit different relations of adjacency. Fig. 07 illustrates a demonstration of this. In a classic puzzle of graph theory, three utilities have to be directly connected to each of three houses by non-intersecting paths. This can be solved on a torus (donut with a hole) but not on a sphere or the plane. A variation of this puzzle, in which four worms need to be guided to each of five apples without path-crossing, can be solved on a torus with two (but no fewer) holes. This was printed on a tote bag to accompany the author's talk, 'Algorithms in Space', at the ACM Conference on Fairness, Accountability, and Transparency, Barcelona 2020. The troubling of categories through the transformations, reframing, alternative metrics and surrogate spaces suggested above operates at the earliest stages of architecture and process design, prior to where much of the current discourse of AI ethics acts (before any consideration of bias due to training data,²⁷ for example). The Algorithmic Realm is brittle, riddled with contingency, built on silica. Look askance, fiercely.



Fig. 07
Tote bag: worms need holes
Tote bag distributed at the ACM Conference on Fairness, Accountability, and Transparency, Barcelona 2020. Each worm must be connected directly to each apple, without any of the paths intersecting. The task is impossible on a plane, a sphere, or a torus – but it is possible on a torus with two holes, or equivalently, a bag with two handles.



References

- Ian Bogost (2015), "The Cathedral of Computation," *The Atlantic*, January 15, 2015. At theatlantic.com/technology/archive/2015/01/the-cathedral-of-computation/384300/
- Denis Roio (aka Jaromil) suggests replacing the term 'artificial intelligence' with 'synthetic meaning'; we suggest that 'synthetic rationalisation' captures the ontology and causality a little more precisely. Cf: jaromil.dyne.org
- Not that AI-powered drug discovery systems are necessarily benign. Flipping a switch (inverting the objective function) of one system led to the generation, in six hours, of 40,000 possible molecules predicted to be more neurotoxic than the nerve agent VX. See: Fabio Urbina, Filipa Lentzos, Cédric Invernizzi and Sean Ekins (2022), "Dual use of artificial-intelligence-powered drug discovery," in *Nature Machine Intelligence*, Vol. 4, Mar, 189–91.
- Category theory, a foundational approach to mathematics (also increasingly important in computer science and more widely), is perhaps the ultimate formalisation of Poincaré's insight. Here, 'category' refers to a highly abstract collection of 'objects' and 'arrows', together with some structure and properties. This approach is sometimes called 'general abstract nonsense': see Saunders MacLane, "The PNAS way back then," *Proc. Natl. Acad. Sci. USA* 94 (June 1997): 5983. doi.org/10.1073/pnas.94.12.5983. For a relatively nontechnical introduction, see Eugenia Cheng (2023), *The Joy of Abstraction. An Exploration of Math, Category Theory, and Life*, (Cambridge)
- A greedy algorithm is myopic – it seeks what is immediately optimal. For a characterisation, see for example Paul E. Black (2005), "greedy algorithm", in his *Dictionary of Algorithms and Data Structures* (U.S. National Institute of Standards and Technology, NIST). nist.gov/dads/HTML/greedyalgo.html
- Proposed edits and additions to Peter Schmidt and Brian Eno's card deck *Oblique Strategies*, whose various editions are thoroughly documented at rtge.net/ObliqueStrategies/OSintro.html
- Michael F. Atiyah (2007), "Duality in Mathematics and Physics", on Riemann's influence in *Geometry, Analysis and Number Theory*, Centre de Recerca Matemàtica (CRM), at the Institut de Matemàtica de la Universitat de Barcelona (IMUB). At imub.upc.es/or/www-fme.upc.edu.
- Read into this also associated terms, such as 'collinear' and 'concurrent'.
- International Bureau of Weights and Measures [BIPM] (2022), *Le Système international d'unités*, 9e édition, (Paris). bipm.org/documents/20126/41483022/SI-Brochure-9.pdf/1cf090b2-04e6-88cc-1149-c3e029ad8232
- Merlin Sheldrake, *Entangled Life. How Fungi Make our Worlds, Change our Minds, and Shape our Futures* (London: The Bodley Head), 99.
- ΔvCs never changes. It does not really matter what numerical value we assign to it, because the size of the unit we measure it in is arbitrary. However, we do have an existing, convenient unit – the second – that we wish to refine, so we assign a value that makes the newly defined second as close as possible to the second by the old definition. Instead of having a fixed definition of the second, and measuring ΔvCs relative to it, we fix a convenient number for ΔvCs and define the second relative to that.
- Though the classification of gender as male, female, intersex or neither is too rigid; a fluid continuum would be better. For discussion, see for example Henry Rogers (2007), *Queer-Text-u-Realities*, Article Press (London/Birmingham).
- David Andrew Griffiths (2015), "Queer Theory for Lichens", *UnderCurrents* 19: 44. See also Sheldrake's *Entangled Life* where he writes: "Lichens are places where an organism unravels into an ecosystem and where an ecosystem congeals into an organism. They flicker between 'wholes' and 'collections of parts'," in his *Entangled Life*, 99.
- Griffiths, "Queer Theory for Lichens", 44.
- Sheldrake, *Entangled Life*, 99
- In graph theory, the branch of mathematics that studies graphs (sets of vertices connected by edges), a tree is a graph in which any pair of vertices is connected by exactly one edge. In computing, such tree structures are a widely used abstraction (notably, for machine learning).
- Kay Rosen (1990), *The Forest for the Trees*. An image of the work can be seen at her website: kayrosen.com/art/19-forest-forthetrees.html
- This homophone is to be read aloud. In homage to Rosen's widespread use of homophones, we offer a pair of phrases; the 'sic' folded into the first phrase points to the homophonous expression that follows.
- Maciej Chichlowski, J. Bruce German, Carlito B. Lebrilla and David A. Mills (2011), "The influence of milk oligosaccharides on microbiota of infants: opportunities for formulas," in *Annual Review Food Science Technology*, 332. doi: 10.1146/annurev-food-022510-133743
- Ed Yong (2016), *I Contain Multitudes. The Microbes With Us and a Grandier View of Life*, (Penguin), 95.
- Y. Cao, V. Fatemi, S. Fang et al (2018), "Unconventional superconductivity in magic-angle graphene superlattices," in *Nature*, 556, 43–50. doi.org/10.1038/nature26160
- Y. Cao, V. Fatemi, A. Demir et al (2018), "Correlated insulator behaviour at half-filling in magic-angle graphene superlattices," in *Nature*, 556, 80–84. doi.org/10.1038/nature26154
- For the principles behind the autostereogram, see C. W. Tyler and M. B. Clarke (1990), "The Autostereogram", *Stereoscopic Displays and Applications*, Proc. SPIE Vol. 1258:182–196.
- Ostrowski's theorem states that every non-trivial absolute value on the field of rational numbers is equivalent to a power of the usual absolute value, or a power of the *p-adic* absolute value (for some prime *p*). For the argument above, we make the assumption that computers represent rational numbers, since apart from special applications of exact real arithmetic, a computer can only represent numbers to finite precision.
- Not that these critiques are not vital. For examples of just how poorly chosen or designed training data sets can be, see Caroline Criado Perez (2019), *Invisible Women. Exposing Data Bias in a World Design for Men*, London, (Chatto & Windus) and Cathy O'Neil (2016), *Weapons of Math Destruction*, New York (Crown Publishing Group).