Machinic Paragenesis: Experiments in Handling Noise as an Artistic Material

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Abstract

To speculate upon the nature of artworks that produce noise is to re-approach automation in more open-ended terms by subjecting oneself to that which is unknown. *Machinic Paragenesis* (2023) is a speculative fieldwork project that attempts to enact this "re-approach." The exhibition documents a creative fieldwork methodology: a series of guerrilla field trips undertaken during a two month residency in Taiwan, where three automated warehouses that deploy biomimetic swarm technologies (automated swarming robots) were of primary focus. Using specific microphones, spatio-temporal frequencies and radio-waves that emanate outwards as noisy labour byproducts from these sites were captured, rendered tangible and channelled into a body of work. Constituting the "everywhen" nature of noise, this outcome seeks to chart points of tension and symbiosis, that are at once hyper-localised yet ubiquitous, between swarming and capital - two systems of organising nature and labour. This paper employs the Shannon-Weaver model of communication to discuss the emancipatory potential of noise in automated ecosystems. Reflecting on the successes and shortcomings of art that attempts to wield this impossible material, this paper questions: How can art's apparent compulsion with aestheticising, decoding or pinning down the phenomenological character of noise possibly be of any use, given that noise is by definition, stuff that is unknown, de-organised, and illogical?

Keywords

Noise, Information, Swarming, Capitalism, Biomimicry, Warehouses, Automation, Labour, Fieldwork, New Media Art.

Introduction

This paper considers the application of noise (unknown signals and disruptive messages within the communication chain) within contemporary media art practice that investigate processes of automation. Specifically, it focuses on noise that is taken from the field (in the form of audio field recordings) and used as a signifier of spatial and temporal locality within our dense and entangled ecosystem of networked organic and inorganic materials. Artists that explore noise through site and time specific new media art practices can be understood as engaging with a paradoxical practice: amplifying chaotic and disruptive signals that at once have potential to generate novel perspectives yet (by definition) render messages illegible. Therefore, the aim of this paper is to firstly provide an epistemological overview of noise, as it is understood through information theory, cybernetics and speculative philosophy Following this, a brief audit of notable ideas surrounding noise, disruptive signals and their generative properties in the realm of systems art will be discussed in relation to *Machinic Paragenesis.* Finally, a reflective analysis of the successes and shortcomings of the project, as well as noise-based art in general, will be carried out.

Emphasising the spatio-temporal locality of noise that billows out from automation technologies, the following text explores how unfamiliar signals can be artistically pieced together to form a networked ecology of place from sites that are at once separate yet connected through the logistics of capital and swarming that coalesce to produce information and entropy.

An Ecosystem of Information, Noise and Art

The popularisation of thinking about our networked material world as an ecosystem of interconnected agents (comprising information, noise, natural and artificial materials, industry, politics and cultural attitudes) can largely be attributed to several semi-concurrent schools of thought and practice of the mid-twentieth century. Notable fields of theory and practical applications emerging from this post-war era that explore the information/noise dialectic leave potent legacies that can still be observed within contemporary discourse surrounding art, systems and noise. Major contributors include cybernetics (publicised through Norbert Wiener's seminal text Cybernetics: Or Control and Communication in the Animal and the Machine [1949]), systems theory (propagated by Claude Shannon's and Warren Weaver's *A Mathematical Theory of Communication* [1949]) and the advent of systems art (popularised by figures such as Jack Burnham, Nancy Holt and Roy Ascott in the 1960's). [1]

Within these respective fields of research and practice, the 1949 Shannon-Weaver model of communication operates as a foundational account of how to think about a social ecology of information and noise (Figure. 1). Initially published in Shannon's 1948 paper, *A*

Mathematical Theory of Communication, before undergoing revisions with the help of Warren Weaver and appearing in their co-authored book by the same title, the diagram evidences how signals are coded, sent through a communication channel, decoded, and deposited at the receiver's end. [2] According to the model, noise enters the communication flow after it has been coded but before it's been decoded.

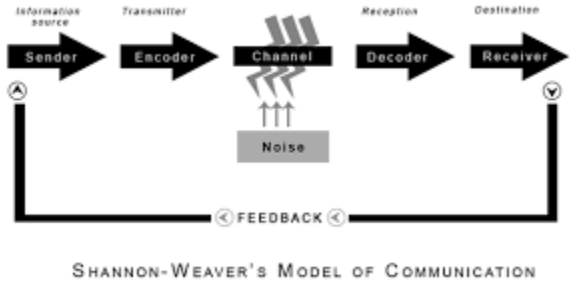

Figure 1: Shannon-Weaver's Model of Communication. ©Claude Shannon and Warren Weaver.

However, a common criticism of the Shannon-Weaver model range is that it is linear and therefore reductive in its illustration of a one-way communication process. Subsequent adaptations have been made to account for this shortfall in Shannon and Weaver's overly simplistic model. The circular model, for instance, emphasises the interactive, back-and-forth construction of information exchange happening at a social level. [3] However, when considering the role of artwork, specifically, as an agent of codifying and relaying information within the social ecology of the gallery, it's worth considering art theorist Paul Goodfellow's recent adaptation of the model which suggests noise is present during all stages of communication (Figure 2).

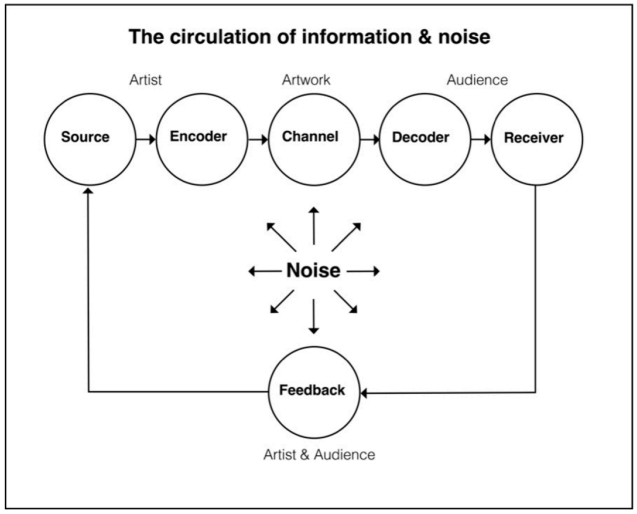

Figure 2: Paul Goodfellow's adaptation of the Shannon-Weaver Model of Communication. ©Paul Goodfellow.

In addition to Goodfellow's updated model, We can look at information theorist Marcia Bate's understanding of information as a structural component to help us think of the apparent information/noise dialectic. Bate subscribes to the idea that "information is the pattern of organisation of matter and energy." [4] The theorist provides the example of information as:

> …the pattern of organisation of the energy of my speech as it moves the air, or of the earth as it moves in an earthquake. Indeed, the only thing in the universe that does not contain information is total entropy; that alone is pattern-free. [5]

Acknowledging that it can be hard to place parameters on a definition of information, due to the generalised usage of the word and our tendency to conflate it with absolutely everything, Bate clarifies that it is rather, the "pattern or organisation of everything - except for total entropy or chaos." [6] Information is the epistemological tool that is available to us for making sense, measuring and recognising patterns in concrete things such as energy, matter, volume, and force.

So how can we differentiate information from noise or total entropy? French philosopher Cecile Malaspina describes this entropic phenomenon in her 2018 book, *An Epistemology of Noise*:

> We can now think of noise in terms of a fundamental epistemological contingency, a state of suspension or indecision, from which reason emancipates itself with acts of self-grounding […] what is at stake with the question of noise, is ultimately a vital and epistemological normativity, an emancipatory act of self-grounding. [7]

This is to say that noise is an essential ingredient in the production of novel ideas. It is the correct formula of difference (luxury) and repetition (necessity) that allows for decipherable, novel data to emerge from the natural world. Malaspina takes her understanding of information as an object that exists between redundant data and chaotic noise - "If it is too random, it is indecipherable static. If it is entirely predictable, it is redundant and conveys nothing new to the recipient." [8] As French philosopher Serres bluntly asserts, "repetition is death. It is the fall into the similar, like the fixed identity of the too-well-known." [9] Redundant data provides a lexicon of constraint from which a message can be deciphered from - it is restrictive, but it is a necessity. Noise, on the other hand, is the pure novelty that cannot be understood as anything but static if it is not preceded by redundancy (necessity). Noise is free

and it is a luxury that is to be appreciated as a part of the ground from which information emerges, argues Malaspina (as Serres had done before her). [10]

Amongst an epoch of digital information, cloud data storage and a densely convoluted material ecosystem that strings together earthly materials with synthetic processes and automated performance, Malaspina's text returns to the systems theory' subject matter that gained notoriety during the mid 20th century with contemporary perspective and critical poise to map the generative potentiality of the entropic disturbance that is noise. However, much like Bate's theory of information, there is a tendency to arrive at the same issue of overwhelming ubiquity when considering noise, making it hard to draw a line of demarcation. This problem is adequately summarised by artist, philosopher and author of the recently published book, *Social Dissonance* (2022), Mattin:

> What the fuck is Noise? Precisely because of its indeterminacy, noise is the most sensuous human activity / practice. To try to fix it or to make it a genre is as fucked up as believing in democracy. [11]

We're now starting to grasp how difficult it is to work with noise as a creative material - How can art's apparent compulsion with aestheticising, decoding or pinning down the phenomenological character of noise possibly be of any use, given that noise is by definition, stuff that is unknown, de-organised, and illogical? This will be discussed in more depth later, but for now we can observe a similar surface-level incompatibility in the partnership between swarming and capitalism. Surprisingly, however, a coalition between noise and art, and swarming and capitalism has transpired. What is even more surprising is that they yield cognitively generative and fiscally lucrative results (respectively) despite a great deal of chaos being produced along the way:

> The interesting thing about swarming is the nagging tension between being "amorphous but coordinated." How is it possible to control something that is by definition constituted by its own dispersal by being radically distributed, spread out, and horizontal? [12]

The apparent productive capacities of the noise/art and swarming/capitalism partnerships is what largely drove the conceptual premise behind *Machinic Paragenesis* - an experiment in coalescing the emancipatory potential of site/time specific ephemeral noise as a creative tool for mapping the tensions between capital industry and ecological organisation.

Concepts, fieldwork and production methodology behind *Machinic Paragenesis*

Machinic Paragenesis takes its name from a geological term. *Paragenesis* refers to the process by which minerals in close proximity affect each other's development. This term was employed as an analogy for the turbulent and unfolding relationship between swarming and capitalism, and noise and information that can be observed through the case study of swarm technologies in fulfilment centres - a machinic paragenesis. Additionally, the geological term mobilise the notion of genesis as an idea that encompasses the project's key interest in information and its productive nature. Genesis as a thematic framework is referenced practically, through the audio-generated animations, and conceptually, in reference to novel and highly productive partnerships.

The project involved using camera, zoom recording device, EMF (electromagnetic field) recording device, sub-AM frequency recording device, and contact microphones to collect footage, audible sounds and invisible frequencies naked to the human ear from three automated logistics centres located on the outskirts of Taipei. All three labour sites deploy swarm technologies (hive-minded networks of robotic vehicles that organise, and delegate tasks based on principles of swarm intelligence found in social insect colonies) as a means of completing logistics work (Figure. 3). As with any technological device powered by electricity, these swarm technologies produce and mediate electromagnetic frequencies and radio waves that emanate outwards into the air as a non-recuperable byproduct of their labouring (which largely comprises a continuous shifting of crates of inventory around across the warehouse floor).

Figure. 3. Amazon Warehouse's Kiva Systems RDU (robotic drive unit). © Robotics & Automation News.

Operating as an audio-visual scaffolding, the footage and field recordings were channelled into a multimedia body of work comprising a single channel video/animation, 3x laser etched acrylic diagrams with aluminium frames, 3x 3D printed sculptures, and 3x audio field recordings. Each individual site is represented through its own laser etched acrylic diagram that serves as a speculative and poetic

mapping of the fieldwork methodology (Figure. 4). The acrylic and aluminium works are paired with 60 second audio recordings of the noise captured at the respective site as well as a 3D printed noise-terrain sculpture (generated by the spatio-temporal-specific electromagnetic frequencies and sub-AM radio wave field recordings captured on location) (Figure. 5). Finally, the video/animation documents the field trip process and new-media construction of the audio-generated terrains (Figure. 6). These components endeavour to chart the trajectory of noise that, when it was captured, functioned only as a chaotic material, a disruptive, inconsequential or anarchic signal that adds nothing to the net-productivity of an otherwise highly efficient logistics operation.

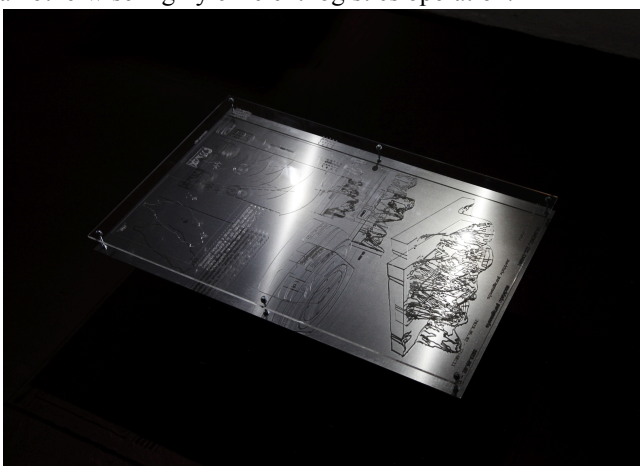

Figure. 4. *MP Blueprint #2* (Laser etched acrylic and aluminium sheet laid flat and supported by two cinderblocks, fixings and construction materials, 800x500x50mm, 2023). ©Samuel Beilby.

Figure. 5. *24.111034, 120.609444 - 2023.05.05 - 16:04:19* (Audio-generated 3D printed sculpture and sound with headphones, 100x130x70mm approximately, 2023). ©Samuel Beilby.

Figure. 6.. *Machinic Paragenesis* video-still (High-definition digital video, 16:9 aspect ratio, colour, sound, 10:07 minutes. displayed on a monitor with speakers, 2023. https://www.youtube.com/watch?v=EZHc8h7JyUU). ©Samuel Beilby.

The notion of swarm technologies in fulfilment centres presented itself as an ideal case study for exploring the pervasive nature of late-capitalism's alienating capacities. The figure of the swarming superorganism social insect has historically been conceptualised as one of the most alien organisms on earth. [13] The development of technologies and worksites that facilitate a "swarming for capital" therefore operates as a testament to capitalism's ability to deterritorialise and open itself up to strange forms of communicative processing - no less, a social organisation of labour that had come to represent the otherness of communism during the cold-war. [14] Subsequently, the application of swarmic organisation to the logistics of capital is a partnership that is fraught with harmonies and hostilities yet is necessitated by the economic nature of swarming and neoliberalism as frameworks for outwards and upwards mobility (respectively) and growth, leading to economies of scale. Whilst this experiment is interested in the streamlined efficiency of automated logistics and social insect swarming, it places a particular focus on information entropy and energy that is lost - the seemingly wasteful expenditure of energy released through the labour process. Driven by concepts of systems theory notions of entropy, waste, information and noise, *Machinic Paragenesis* enacts a methodology whereby undesirable noise is caught and dragged back into the production chain, reprocessed and put on display. Yet despite its transgressive and destructive aesthetics, this exercise of noise-recycling (or rather noise-fetishisation) offers a framework for transforming noise back into productive information so as to render it legible. In other words, it forces an order upon a chaotic formlessness - re-meshing an excessive luxury into a profitable necessity.

The striking compatibility between swarming and capitalism makes sense given the latter's dysfunctional nature, reflects philosopher Ray Brassier:

> It works by breaking down… fuelled by random undecidabilities, excessive inconsistencies, aleatory interruptions, which it continuously reappropriates, axiomatizing empirical contingency. It turns catastrophe into a resource, ruin into an opportunity, harnessing the uncomputable. [15]

Additionally, Brassier provides an illuminating reflection on the abstract relationship between noise and capitalism:

> What I consider to be interesting about noise is its disorganizing potency: the incompressibility of a signal interfering with the redundancy in the structure of the receiver. Not transduction but schizduction: noise scrambles the capacity for self-organisation. [16]

This passage of text from a conversation between Brassier and philosopher Bram Ieven is of particular relevance to the *Machinic Paragenesis* methodology since it involved taking noise from the field (site and time specific), and applying it to otherwise rudimentary structures (the "redundant data" of the familiar that Malaspina speaks of). The animation component of the project demonstrates this process: viewers can observe audio signals from a field recording interfering with the structural form of rectangular blocks, causing them to contort and glitch in real time. This illustrates noise's capacity to "scramble" the familiar logistics of warehouse labour that developed from Fordism. Subsequently, the act of scrambling ordinary shapes with noisy signals (that is documented in the animation) mimics the application of swarming to logistical organisation of late-capitalism, manifesting as swarm robotics' deployment in fulfilment centres. Analysing this process through the lexicon of information theory, swarming can be observed as a form of social organisation (largely regarded to be the most alien on on earth) that has been compressed into a set of patterns (i.e legible information with minimal noise) and applied to the logistics of capital. In other words, what is of conceptual interest here is taking an abstract form of labour, swarmic organisation - developed and appropriated from social insect labour found in the natural world - and applying this to the familiar logistics operation of the warehouse.

Reflecting on the success, limitations and potentials of noise as an artistic material

Depending on how one looks at it, the *Machinic Paragenesis* methodology and outcome contains moments of success and failure, in its handling of noise. What is for sure, is that the obscure nature of noise complicates this analysis. After all, Malaspina asserts that noise's generative capacity to spark cognitive invention is rooted in its destructive nature, functioning as a "negation of the negation of contingency." [17] If contingency here is to be taken as the potentiality of that which is unexpected, unknown or chaotic, then Malaspina is suggesting that invention is borne from the destructive negation of regularity (i.e. noise). In other words, noise produces *through* destruction. With this in mind, analysing the project now becomes a matter of reflecting on how this spatio-temporal noise was handled, what kind of production and destruction it caused and how my interference deterred it from its original trajectory.

Beginning with its success, *Machinic Paragenesis* yielded a paradoxical outcome that was productive in that it was reflective of the contradictory nature of both noise (at once productive and destructive) and swarm technologies (at once "amorphous but coordinated") [18]: On one-hand, it can be recognised as a DIY experiment in reconnaissance art-making that amounts to both an exposition of capitalism's definitive exploitation of the natural world, and highlights the emancipatory potential of noise as an artistic material for charting complex tensions particular to our late-capitalist reality. On the other-hand, the project ironically drags noise back into the meat-grinder, commodifying the emancipated remnants of a labour built upon harvested bio-organisation and amounting to a diminution of the liberatory potential of noise in production systems. This experiment ultimately produced a result where product and byproduct, luxury and necessity, repetition and difference were blurred, confused and hybridised - outcomes that speak to the indeterminacy of noise. The project doesn't attempt to offer a practical solution to nullify such tensions between swarming and capitalism. Instead, the plan was to showcase an information rich methodology in the hopes of nudging audiences to rethink the role of the noise and the non-human in the production of automated swarming and its post-production reverberations. Juxtaposed against a the constraint of information (exemplified by the precise geographical coordinates, excessive time-stamping, diagrams and maps on display), the project attempted to exhibit noise in a way that was "informative" by taking on Malaspina's advice:

> Neither absolute uncertainty nor complete redundancy, on their own[...] suffice for a notion of information that does what the word information says, which is to inform. [19]

The major flaw of the project however, lies in the fact that this handling runs the risk of posturing itself as a creative fieldwork methodology and exhibitionary display that tries to "fix" noise, to use Mattin's term. [20] Originally, the 3D printed, audio-generated noise terrains were conceptualised as a formal discovery of noise, an attempt to display its concrete existence in the world by turning it into a tangible object (Figure. 7). From the beginning, the works had always aimed to explore how

natural swarming, an inherently noisy form of social organisation, is captured, rendered legible and has its informational properties applied to late-capitalist logistics, which in turn produces a new noise that emanates outwards from fulfilment centres as a byproduct. In short, I was interested in comparing noise from natural swarming (pre-fulfilment centre) to noise from artificial swarming (post-fulfilment centre) and showcase the emancipatory potential of noise to generate new perspectives and ways of interfacing with organisational systems. The major challenge of this endeavour was attempting to render that which is overwhelmingly complicated in its informational density into digestible information without restraining its emancipatory nature. How do you emphasise the emancipatory potential of something that is so obscure within the confines of an art gallery?

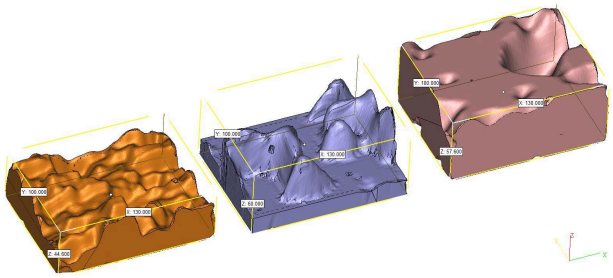

Figure. 7.. Noise-terrain 3D printing design files for sculptures *25.1041919, 121.7708885 – 2023/05/01, 15:35:42*, *24.947317, 121.134892 - 2023.05.02 - 17:48:11*, and *24.111034, 120.609444 - 2023.05.05 - 16:04:19* (left to right). ©Samuel Beilby.

Shortly after completing the fieldwork expeditions, it became apparent that there was no way of producing an exhibition that channelled this noise-material into objects (sculptures, laser cut acrylic diagrams, MP3 files and a video component) without diluting its complexity. In between the first project's work-in-progress exhibition debut at Treasure Hill Artist Village (Taipei, Taiwan) and the second exhibition at Current Gallery (Walyalup/Fremantle, Australia), the conceptual aim of the project shifted to a more realistic outcome. Instead of attempting to map out that which is, by definition, unknown, I settled on highlighting the process of abstraction carried out by late-capitalism and how this could be experienced sensorially by through noise. In other words, attempting to collect and assemble noise in the form of an artwork that functions as a vehicle for uncovering truth is to miss the point - "Noise has no such epistemic valence". [21] Instead, a far more practical handling of noise involves using it as a tool that provides us with epistemological understanding of the process of abstraction. This is to say that noise can be useful as an artistic or epistemological tool as it presents us with chaotic objects and densely convoluted signals to investigate, probe and reverse-engineer the process of abstraction. In their respective philosophies on noise, Bates, Mattin, Malaspina, and Brassier all seem to arrive at the idea that it's emancipatory potential lies in the fact that it forces subjects to override conceptual predeterminants, "cognitive schemas and perceptual Gestalts". [22] It is important to clarify that noise cannot reveal truths about reality, however. Noise just highlights the relation between contingency and control.

This focus on showcasing the collected noise as the post-production artefact of abstraction (that passed through the fulfilment centres before being cast out in the air) lead to producing artworks that relied on diagrammatic aesthetics in the form of charts, maps, data and numbers (Figure. 8). juxtaposed against the abstract noise-terrain sculptures and glitchy audio field recordings playing through the headphones. The aim was to fill the space with repetitive, legible information that signalled towards a didactic sequence through which noise was generated, but leave enough gap in between the input and output signals (or sender and receiver, if we were to use the Shannon-Weaver model), so that audiences were encouraged to speculate on the abstraction process and noise floating around in the communication chain.

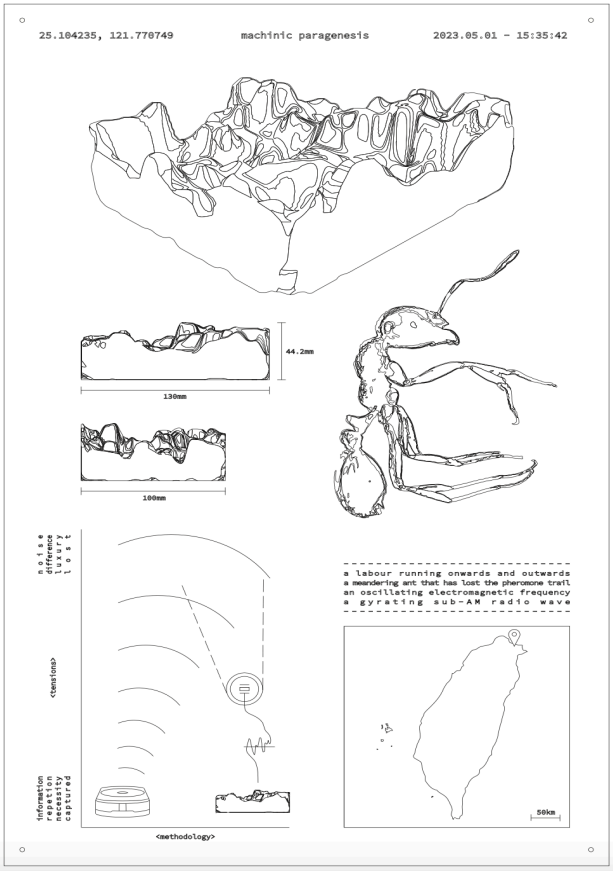

Figure 8. Laser etched acrylic design files for *MP Blueprint #1*. ©Samuel Beilby.

Whilst this re-prioritising of the project's artistic intent was generative in that it revealed the process of abstraction of natural swarm labour into technological swarm labour and then into entropic waste in the form of electromagnetic frequencies and sub-AM radio waves, the rendering of the noise-terrains sculptures nevertheless restricted the emancipatory potential of this noise. The diagrams in the bottom-left hand corners of *MP Blueprint #1, MP Blueprint #2, and MP Blueprint #3* sketch this process of noise emanating from the worksite, being captured through field recording devices and visualised as a black noise terrain (Figure. 9). Ultimately, the handling of the noise reduced it to a pattern of organisation rendered through an animation software, which a 3D printer was then able to read as legible information, before printing it out into a static object that sat motionless and restrained in a gallery space Therefore, as much as this re-processing of noise was effective in showcasing how late-capitalism builds economies of scale from chaotic signals and alien swarm logistics, it resulted in a diminution of noise. In other words, what makes *Machinic Paragenesis* successful is its failure, its propensity to reduce - production via destruction (and vice-versa).

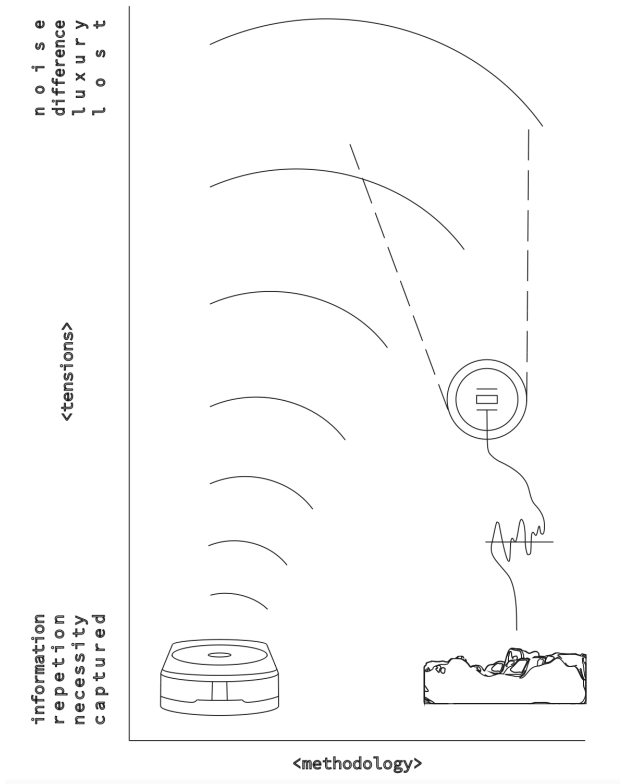

Figure 9. Closeup of laser etched acrylic design files for *MP Blueprint #1*. ©Samuel Beilby.

Conclusion

The drawbacks of pushing noise to the conceptual centre stage of any creative project that (and especially those that deal with complex new media technologies tightly locked away behind inaccessible mega-corp labour sites, no less) is that noise competes against the more "grounded", legible information that humans are, by default, conditioned to prioritise. Even in the current climate of electronic, new media and research based contemporary arts practices that dominates so-called conceptual art discourse of today, audiences understandably struggle to accommodate dissonance into their conceptual register. This isn't to say that viewers haven't garnered an appreciation for noise (both conceptually and aesthetically) rather, the very nature of noise predicates its inaccessibility. To attempt to capture noise and illustrate its generative potential through art is to strip it of its most potent entropic qualities. This is of course contingent on the fact that, if art did not pursue noise as a creative material, an epistemological tool for opening up audiences to new experiences, perspectives and attitudes, then we wouldn't be susceptible to its generative nature. This paper proposes that the answer then, is not to attempt to fix or master a comprehensive understanding of certain noises as this would be an attempt at making legible information out of lawless formlessness. Instead, an artistic handling of noise should strive to emphasise its dissonance. Likewise, audiences ought to embrace noise's alienating capacities. Regrettably, artistic mediation always results in some sort of diminution of noise anyway. Given this inevitability, the best that *Machinic Paragenesis* can do is to approach noise as a chaotic field material "...embedded in abstract relations of production," [23] specifically focussing on the case study of alienation that is produced through the strange logistics of swarming and late-capitalism.

Placing sound at the centre, the project hopes to be productive in its exploration of the generative potential of spatio-temporal noise. Using DIY recording processes to tap into unheard sonic emanations being leaked from a burgeoning and somewhat familiar labour that implicates both machines and social insects, a rough outline of a machinic paragenesis of the technological and ecological comes into purview.

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