Cuando hay santos nuevos los viejos no hacen milagros

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Abstract

This thesis investigates the potential of artistic processes in seeking alternative knowledge, while acknowledging the inherent limitations of attaining complete understanding of any given subject. It critiques the role of fixed categories within current social and epistemological structures by analyzing how Western culture has understood the generation of knowledge, in parallel with the establishment of power structures based on processes linked to colonialism and proposes different ways of knowing and interacting with natural and technological systems using arts-based inquiry.
The research is situated at the intersection of fungi, slime mold, and artificial intelligence processes, exploring connections through aesthetic experiences and speculative-oriented practices. The work is divided into three main sections: an account of the initial steps and influences that shaped the project, an examination of the methodology of speculative collaboration, and a discussion of the final artwork and the insights derived from it. This work contributes to the discourse surrounding possible and integrative approaches to knowledge and interaction within natural and technological systems, offering a critical perspective on the interplay between art, science, and technology in the contemporary world.

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Introduction

As I entered the MFA program at Stamps, the world was emerging from the grip of the Covid pandemic, and like many others, I was gradually transitioning back to a semblance of normalcy after the extended period of quarantine. During this time of isolation, I found myself inexplicably drawn to the subjects of fungi and neural networks. Perhaps these thoughts were rooted in my adolescent memories of wandering through the cow pastures of the Andes mountains, searching for psychedelic mushrooms that grew in the wild in response to how the digital took over the way we interacted with the world during the pandemic. Whatever it was, the lockdown experience had a profound impact on my mind, leading me to reconsider my relationship with the world. My initial intention was to explore questions about the nature of knowledge acquisition and how my present experience could be conceived in a world that is deeply interconnected yet seemingly distinct from us. As I navigated the uncertain landscape of a post-pandemic reality, I sought solace in revisiting my relation with nature, while also exploring the vast, intricate networks that underpin our increasingly digital existence. In this context, fungi and neural networks emerged as parallel symbols of resilience, adaptability, and interconnectedness and they began to enter my art practice.

In this thesis, I investigate the process of seeking knowledge through a creative process while acknowledging the inherent impossibility of attaining complete understanding of any given subject. Fixed categories about things have proven useful for specific purposes within our current social and epistemological structures; however, I argue that they can also serve as tools of domination. Such conceptions arise from a deeply entrenched pattern of hyper-specification, primarily driven by academic knowledge and rationality as the predominant means of knowing the world. But recent scientific, technological, philosophical, and artistic developments offer frameworks for uncovering underlying connections within a seemingly disparate array of phenomena that could allow us to understand things beyond rational and dominant ways. The aesthetic experience, with its unique ability to engage with matter and thought, can play a vital, synthesizing role when exploring these connections, particularly when adopting a

highly speculative-oriented practice.

As a maker and researcher, I have now become dedicated to exploring alternative, collaborative, and integrative approaches to understanding the world. I seek to challenge conventional perspectives on the relationship between nature and technology through speculative creative practices that ultimately manifest as artworks. While imagination can allow for certainty and uncertainty, the speculative use empirical methods to arrive at uncertain conclusions, hypothesizing different results than dominant thinking would arrive at.This brings me to my research question is: **How can I propose alternative and integrative ways of knowing and interacting with natural and technological systems using methods of speculation combined with arts-based inquiry?** To address this question, I utilize apparatuses of knowledge production to facilitate speculative exploration and create aesthetic experiences that situates itself in the intersection of fungi, slime mold, and artificial intelligence processes.

This thesis charts the course of experimentations, theoretical explorations, and visual references that have informed my final work. In the first section, I discuss my initial steps toward the project, highlighting two key elements that persist throughout the process: fungi and neural networks. Subsequently, I elaborate on a series of visual experimentations, demonstrating how they guided me toward the concepts of Systems Thinking, Object-Oriented Ontology, and Alternative Epistemologies. Additionally, I examine the work of influential artists who have significantly impacted my practice.The second section delves into my methodology of speculative collaboration. I elucidate how this approach enables me to address my research questions by exploring the diverse creative strategies I employed in bringing my final work to fruition.In the concluding portion of the thesis, I focus on the description and discussion of the final work, as well as the insights gleaned from it. Through this exploration, I aim to contribute to the ongoing discourse surrounding alternative and integrative approaches to knowledge and interaction within natural and technological systems.

By challenging traditional perspectives and embracing the potential for unexpected discoveries, this work offers a fresh perspective on the interplay between art, science, and technology in the contemporary world.

Los primeros santos (the first saints) Fungi/Slime molds and Neural Networks

> “Our first step is to bring back curiosity. Unencumbered by the simplifications of progress narratives, the knots and pulses of patchiness are there to explore."
>
> Anna Tsing The Mushroom at the End of the World[1]

Paul Stamets, in his book “Mycelium running”[2] introduces us to the fascinating world of fungi and focuses particularly on mycelium, which can be better understood if we compare it to the root system in plants. Stamets talks about how fungi is present everywhere and how its species surpases other species by far in terms of quantity in the plant kingdom. He also discusses the basic properties of these organisms and points out how important they are to the life and death cycle of nature and states that without them everything would fail. Stamets argues that mycelium can also be compared to the neurological networks of nature itself as it serves as a connector between everything that surrounds it. This is because mycelium grows through the soil, forming a vast network of interconnected filaments that can extend for miles.

The human connection to fungi also is significant in that we as animals are more closely connected with it than any other organisms (such as plants). The mycelium is a sensitive membrane that is constantly aware of any stimulus or change that is produced in its environment, and this, along with its adaptation capabilities, makes it an ideal system for information exchange. Its complex characteristics can be also compared to the way computers work, and mycelium even surpasses certain technological systems and can be compared to the interconnectivity of the internet.

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[1] *The Mushroom at the End of the World*, 2021, https://press.princeton.edu/books/paperback/9780691220550/the-mushroom-at-the-end-of-the-world.

[2] Paul Stamets, *Mycelium Running: How Mushrooms Can Help Save the World / Paul Stamets*, *Mycelium Running: How Mushrooms Can Help Save the World / Paul Stamets* (Ten Speed Press, 2005), http://dx.doi.org/9781580085793.

Many people might question whether this organism is intelligent, but in order to demonstrate this intelligence, Stamets provides an example of an experiment made by scientist Toshuyiki Nakagaki, which consisted in using a slime mold called Physarum polycephalum in a maze like structure along with nutritious oat flakes located both at its entrances and exit. The mold was able to grow and move through the maze successfully, finding the shortest path to the exit and avoiding dead ends, which could be considered as illustrating some form of intelligence proper to these organisms, depending on how intelligence is defined. Regardless of what we deem as “intelligence,” however, this experiment does show the relationship between fungi and neural networks. Neural networks can be defined as a class of machine learning models inspired by the biological structure and function of the human brain. They consist of interconnected nodes called neurons, which are organized into layers. In simple terms, neural networks learn to recognize patterns, classify data, and make predictions, similar to the way the slime mold navigated the maze.

The organizational pattern found in mycelium networks can also be found in the patterns of dark matter and hurricanes as well as in the pattern found in string theory, and Stamets speaks about these resemblances as not just being mere visual coincidence: “it may be that mycelium exploits the natural momentum of matter, just like salmon takes advantage of the tides”[3]This reveals mycelium’s responsiveness to its environment. After being introduced to the characteristics of such intriguing organisms, I became particularly curious about a type of fungi known popularly as lion's mane (fig 1.), which some people claim can even help restore neural connections.

[3] Stamets.

Figure 1. Lion's Mane Mushroom

The suggestion of mycelium being the neural networks of nature, as well as the alleged benefits of the Lion’s Mane mushroom, took me back to those moments during covid lockdown in Venezuela when I started to make my first experiments with machine learning neural networks. During that time I trained models with data gathered from fungi illustrations in order to generate artificial fungi, which I then used to create digital compositions that could be put in dialogue with photographs of real things, such as animal bones and agricultural colonial tools, among others. This allowed me to begin to think about the relationship between artificial and natural systems. (Fig 2.)

Figure 2. Omnia Artificialis, AI generated fungi drawing, digital collage, 2020.

However, I still felt I needed to explore this connection further. In considering this, I asked ChatGpt: What are the similarities between artificial neural networks and mycelium networks? Using Chat Gpt to point out such similarities seemed important to me in order to delegate agency into this artificial language model, which is in a way commenting about itself. This action would come to take an important role later in my work. It responded with the following:

> Artificial neural networks and mycelium networks share similarities in their structure and information-processing capabilities. Both consist of interconnected nodes (neurons in neural networks and hyphae in mycelium networks) that transmit and process information. They exhibit adaptability, decentralized processing, and robustness, allowing them to efficiently handle complex tasks and adapt to changing conditions. However, they are fundamentally different, with artificial neural networks being computational models and mycelium networks

being living biological systems.[4]

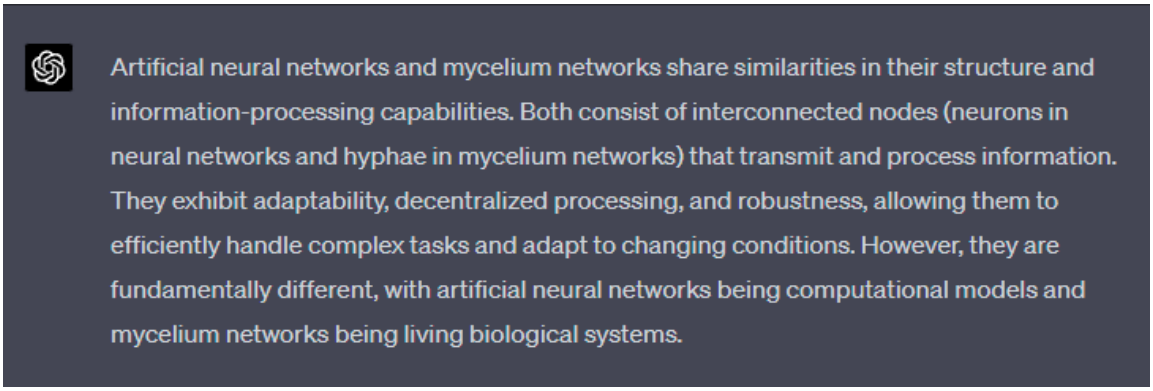

Figure 3. ChatGPT Output

ChatGPT's attempt to find similarities between itself and mycelium networks is indeed impressive, but it raises questions about its ability to truly understand these complex biological systems. When asked to act as a mycelium network, ChatGPT responded that it could only try to imitate the system, lacking the capacity for speculative thinking to provide a different response. In light of these limitations, I decided to further explore such similarities by gathering visual data (12,567 images) from the fungi database of the University of Michigan Herbarium to train a machine learning model. This model was able to generate images that were similar but unique to the input dataset. (Fig 5.)

Concurrently, I started to grow Lion's mane mushrooms and observed their growth. Once some of the lion's mane fruiting bodies I was growing matured, I dried them and began consuming them daily in the form of tea and as a cooking ingredient. I aimed to transcend the boundaries of my cognitive system by closely observing the growth of these mushrooms while simultaneously consuming them, allowing them to influence my perception and thoughts about the entire process. The mushroom interpreting itself through me was an attempt to understand the existence of a system so closely related to me, yet so different at the same time; however , I am not aware of any particular insight that I would be able to identify as produced by the ingestion of such a mushroom, maybe it was the mushroom's ability to enter into my cognitive system,

[4] "ChatGPT," accessed April 25, 2023, https://chat.openai.com.

adapting and influencing it in an almost unnoticeable way?

By closely observing the growth and transformations of the fungi in both real and artificial scenarios, I was able to contemplate the complexity of these systems and my own inability to fully comprehend their functioning. I was interested in the systems inherent in both the fungi and neural networks as well as those being generated in the scenarios I had set up. Thus I arrived at the following questions: How does a mycelial network experience the world? How can I facilitate its interaction with a machine learning neural network?

These questions emerged intuitively, but took on a clearer form when I connected them to the work of physicist Fritjof Capra and Pier Luigi Luisi, who described systems thinking in their research. In Fritjof Capra's book, "The Systems View of Life: A Unifying Vision," he presents fundamental characteristics of systems thinking that, in a way, capture how I began to conceive this work and the tools I was using. One of the most relevant aspects was the shift from thinking in terms of separate parts to considering the whole, where the properties of the whole cannot be reduced to its components. These interactions between the individual components of the system can give rise to emergent properties, which means that the collective behavior of the system cannot be easily predicted by simply understanding the behavior of individual components. In other words, the whole is greater than the sum of its parts.[5]

[5] Fritjof Capra and Pier Luigi Luisi, *The Systems View of Life: A Unifying Vision* (Cambridge: Cambridge University Press, 2014), https://doi.org/10.1017/CBO9780511895555.

Figure 4. First critique work

I embraced these concepts as an approach to describing how I was understanding my work. However, I was aware that my work was not yet attempting to illustrate or specifically address these concepts. So I continued experimenting with these elements, seeking to connect such systems. I began creating digital compositions in which real images of fungi engaged in direct dialogue with artificially generated images. (fig 5) and then displayed them over the floor of the exhibition space in

combination with the real specimens of fungi, which were placed in a vintage secretary desk. (fig 4). Such an attempt allowed me to have an initial approximation of these connections, but I was not satisfied with this outcome as what I really wanted was to hybridize such systems in such a way that no duality regarding the real and artificial object were present. In order to find more surprising connections between artificial and natural systems, I began to speculate upon the way these systems, with their different cognitive configurations, might have an experience of the world that is radically different from mine as a human.

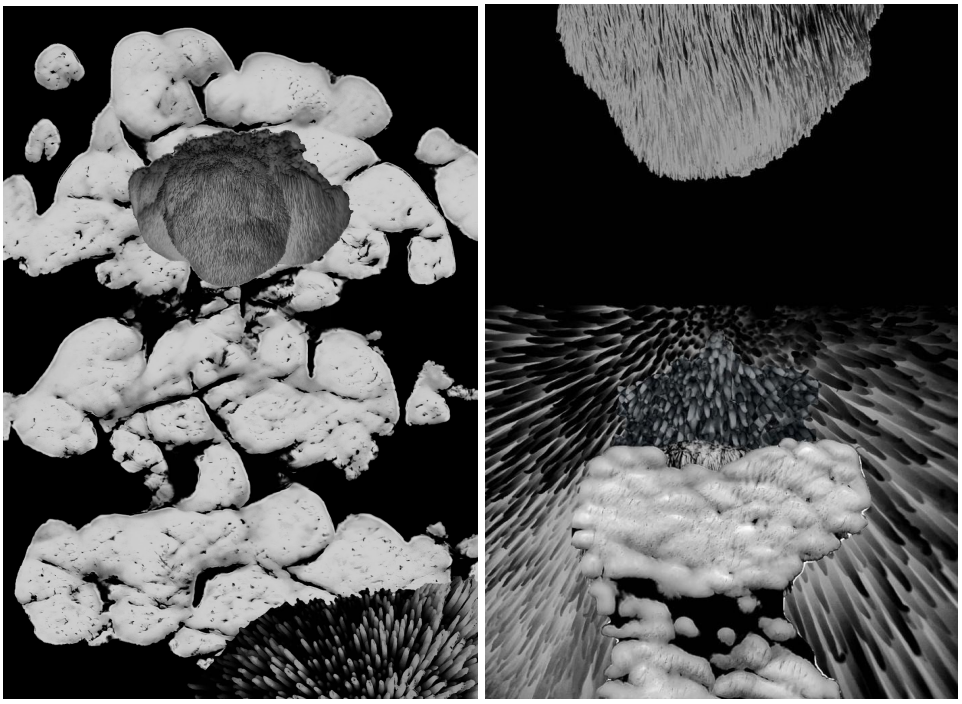

Figure 5. Digital collage of AI generated images of fungi with real depictions of fungi.

La existencia de los otros (The existence of the others)

"The world is not the world as manifest to humans; to think a reality beyond our thinking is not nonsense, but obligatory." The Speculative Turn: Continental Materialism and Realism, Edited by Levi R. Bryant, Nick Srnicek, Graham Harman.

Thomas Nagel's essay "What is it like to be a Bat?" posits the idea of transcending anthropocentric perspectives while acknowledging the improbability of achieving this feat. This improbability primarily stems from our own limited cognitive structures, which prevent us from directly experiencing what a bat might perceive. Nonetheless, his discussion remains crucial to the attempt to think beyond human experience:

> Even if I could by gradual degrees be transformed into a bat, nothing in my present constitution enables me to imagine what the experiences of such a future stage of myself thus metamorphosed would be like. The best evidence would come from the experiences of bats, if we only knew what they were like.[6]

Although such contemplations may ultimately be speculative, they push us to further inquire about what defines reality and how other species, distinct from our own, may or may not have experiences comparable to ours.Being merely empirical when thinking about the others existence is not enough. This concept also aligns with Graham Harman's object oriented ontology or 'OOO' philosophy[7], which is dedicated to exploring the reality, agency, and "private lives" of nonhuman (and/or nonliving) entities—all of which are called "objects." This is intrinsically related to a rejection of anthropocentric ways of thinking about and acting in the world. This concept counters the view that things are only real if they are sensible to a human subject, claiming that things exist beyond human conception, but that this existence is almost inaccessible to our understanding. Ultimately, what I found most attractive was that "OOO" considers art

[6] Thomas Nagel, "What Is It Like to Be a Bat?," *The Philosophical Review* 83, no. 4 (October 1974): 435, https://doi.org/10.2307/2183914.
[7] "What Is Object-Oriented Ontology? A Quick-and-Dirty Guide to the Philosophical Movement Sweeping the Art World," Artspace, accessed December 17, 2021, http://www.artspace.com/magazine/interviews_features/a-guide-to-object-oriented-ontology-art.

objects or the aesthetic experience as the ideal field in which to think and engage with this philosophy. Timothy Morton, another member of the “OOO” movement states, “An artwork cannot be reduced to its parts or its materials, nor can it be reduced to its creator’s life, nor to some other context… Art is charisma, pouring out of anything whatsoever, whether we humans consider it to be alive or sentient or not.”[8] Here Morton emphasizes the independent properties of art objects which are manifested directly by their inherent nature, meaning that its signifiers are not only determined by the human projection upon such objects. This suggests that the art experience is the ideal place to let objects (ex: fungi or ai) express their reality through their natural configurations, which ultimately do not depend on human projected meanings.

These considerations led to the second stage of this work, in which questions that arose from the first iteration were examined. For this iteration I asked, “How can my experience about this process be modified by the active components of the fungi that work in my cognitive system?” and “Is it the fungi interpreting itself through me?” I decided to ask these questions to what system and that the answers be shared using a Sir David Attenborough impersonator. This choice aimed to challenge the taxonomical and results-oriented intentions of scientific methods by impersonating the famous narrator and creating a sense of distance between myself and the fungi. I realized then that this also connected to another component that had been present in my work from the beginning. I found myself heavily invested not only in the intrinsic characteristics of these natural and artificial systems, but also in the tools used to present them, including both analog and digital archives, documents, boxes, cabinets, labels, and desks. In a similar way to such signifiers of knowledge, rather than clarifying what is being seen, the narrator acts as a tool for speculation given that he is not real himself.

Additionally, the physicality of the mushroom that was previously part of the installation was transformed into a virtual 3D object, which was then immersed within images of real and artificial specimens. The voice of the narrator comments on these images and asks questions while the viewer engages with the visual elements of AI generated fungi and 3D renders of the physical installation. This interaction let me recognize that there were epistemological issues woven throughout the project.

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[8] “What Is Object-Oriented Ontology?”

Figure 6.Still frame from video. Ai generated images, 3d renders, Impersonator's voice.

Boaventura de Sousa Santos, in his work "Epistemologies of the South and the future,"[9] introduces the concept of "epistemologies of the South," emphasizing the importance of engaging with diverse perspectives and ways of knowing from those who have suffered under colonialism, capitalism, and patriarchy. In Santos' view, the global South transcends geographical boundaries, representing human suffering caused by capitalism and colonialism, as well as resistance against these systems. He posits that "epistemologies of the South" offer a fresh foundation for understanding societal transformations and are essential for reinventing social emancipation on a global scale.

Santos underscores the convergence of two timeframes: the pressing need for immediate action in response to urgent issues such as climate change, and the necessity for profound civilizational shifts. This dual uncertainty presents new challenges and demands a different temporal outlook. Santos contends that, due to centuries of colonialism, the global North has lost its ability to learn from the experiences of other nations. This state of affairs is reflected in Western Eurocentric critical theory, which has reached a point of stagnation. While solutions to current problems exist, alternative ways of conceptualizing these solutions are lacking. Santos proposes two

[9] Boaventura de Sousa Santos, "Epistemologies of the South and the Future," 2016.

principles for "epistemologies of the South": understanding that the world exceeds the confines of Western comprehension, and acknowledging the world's limitless diversity. The epistemologies of the South address ways of knowing that are often dismissed by Western thought.

Santos also presents the concept of the "abyssal line," an unseen demarcation between metropolitan and colonial societies that has persisted for centuries. Theories and universalisms have been rooted in experiences from the metropolitan side of the line, while the other side remains concealed. This exclusion and silencing of the other side has resulted in a Western-centric conception of humanity that encompasses sub-humanity, which Santos believes humanity must overcome to create a more equitable world.

To accomplish this, Santos argues that we require a sociology of emergencies, which treats the necessary as possible. This involves crediting other forms of knowledge, including popular, vernacular, and artistic knowledge. Intercultural translation enables us to recognize similarities and differences among alternative knowledge, fostering hybrid forms of understanding. He discusses the evolving nature of knowledge and epistemology in the contemporary world, emphasizing how the multiplicity of human experiences and ways of knowing has culminated in an "infinite plurality of finite ways of knowing" and arguing that modern science is ill-equipped to guide our understanding of these diverse ways of knowing and that engaging in dialogues with other cultures is essential. In doing so, he raises the question of whether a new epistemological method can be based on the epistemologies of the South and discusses the challenge of incorporating non-extractive methodologies. These methodologies aim to avoid transforming alternative knowledge into raw materials for scientific knowledge production.

Delving into Santos' proposal for alternative forms of knowledge offered me some clarity regarding the intuitive processes that were already embedded within the iterations of my work. His insights also allowed me to develop a respect for the incompleteness of all knowledge, as Sousa discussed in his text as being embodied by Nicholas of Cusa's concept of "learned ignorance," a concept which asserts that “no greater knowledge can endow any man, even the most studious, than to discover himself supremely learned in

his ignorance, which is proper to him, and he will be the more learned, the more ignorant he knows himself to be."[10]These processes were evident in my use of knowledge dissemination frameworks, which encompassed speculative thinking and in the creation of aesthetic experiences that combined the use of fungi, slime mold, and artificial intelligence processes to generate "new hybrid forms of cultural understanding."[11]

Los hacedores (The makers)

To gain a more comprehensive perspective on my actions, I sought to expand my references by examining how other artists addressed similar questions and materials. Interestingly, the majority of these artists are from Latin America. While there was no conscious decision initially to find references from a similar geographical context as mine, the fact that most of them are from Latin America convinces me that there are shared interests, methods, and processes that are shaped by the fact of growing up and living in the region. I have categorized the following artists into these groups: Bio-related, Biology/AI, Media and Politics, and Ontological and Epistemological issues.

Bio-elated

StudioThinkinHand

Studio Thinking Hand is an art collective interested in artistic practices that involve the presence and interaction with non-human species such as Fungi, bacteria, etc. They utilize science and technology and are interested in proposing a different point of view that goes beyond binary categories. Mycogenesis (fig. 7) is an installation which is alive, it consists of a combination of fungi, yeast and bacteria hosted inside glass made

[10] Santos, "Epistemologies of the South and the Future."
[11] Santos.

sculptures. As the artists state, “The work questions what intelligence is and where it is located beyond the human perspective of reason, rationality and the mind towards sensuous, embodied, relational knowledge and asks us to reflect on the other species and microbiomes we share our bodies and existence with.”[12] Studio thinking Hand’s way of working with non human species and the concepts they extract from working with such systems are very similar to my work in terms of materials used and conceptually as well; however, my aesthetic decisions regarding how to present these are very different from them as I am interested in utilizing them as tools to reveal the impossibility of understanding certain knowledge systems other than humans.

Figure 7. *Mycogenesis by Studio ThinkingHand*

Juan Carlos León

Juan Carlos León, an Ecuadorian artist currently residing in Mexico, has a body of work that embodies a hybrid identity. His creations bridge the past, present, and future while

[12] Studio Thinking Hang, *Mycogenesis*, 2021, Installation, Variable, 2021.

encompassing culture, nature, art, and science. León often works with materials that possess rich physical and symbolic qualities, such as oil, water, mushrooms, and medicinal plant extracts, which also convey economic, religious, mythological, and cultural connotations. He is intrigued by how technological advancements provide humans with the illusion of power over nature.

Eduardo Carrera discuss León in his text “Afectividades, hongos y planetas,”[13] in which he describes how he explores various collaborations between human and natural elements by designing controlled human environments that, over time, yield to an organic process. Leon has produced a series of works in which he places spores of Penicillium and Rhizopus fungi, as well as yeasts, on Petri dishes. By controlling humidity, temperature, and light, mold begins to grow. Once the fungus integrates with the paper and the information, it continues to expand. After a few weeks, the mold assumes abstract forms, creating its own display of living information. This sort of hybridity achieved by the integration of the paper with the fungi allows a material hybridity that would carry meaning as well.

In his “Kallumpakunamikan Shunku” series of paintings (fig 8), Leon also explores the infinite ways in which materials such as Penicillium mold fungi, iodine, and gentian violet can be applied to create abstract and colorful compositions on modified canvas-containers resembling Petri dishes. Leon employs iodine and gentian violet not only for their wound-healing properties but also for their vibrant color qualities – a striking fluorescent orange and violet that undoubtedly transform and captivate our gaze. This offers a distinct perspective on death, suggesting that the fading of life is part of a body's permanence and the continuity of a cycle.

Visually, the series of inks also alludes to the graphics used in 1970s and 1980s science fiction posters, while simultaneously challenging the notion of a lasting, eternal, and unchanging pictorial practice. These compositions visualize information from unsent or unreceived emails, social media comments, or handwritten notes that reflect Carlos's relationship with his mother prior to her passing. Commentary on his work focuses on his almost mystical devotion to the act of making and a desire to communicate through

[13] Terremoto, “Afectividades, hongos y planetas,” Terremoto, accessed April 25, 2023, https://terremoto.mx/revista/afectividades-hongos-y-planetas/.

symbols and nuances. I subsequently engaged in a similar practice as Carlos, but rather than a personal story, I connected it with a particular situation of mining activities in Venezuela which would be later discussed in the work.

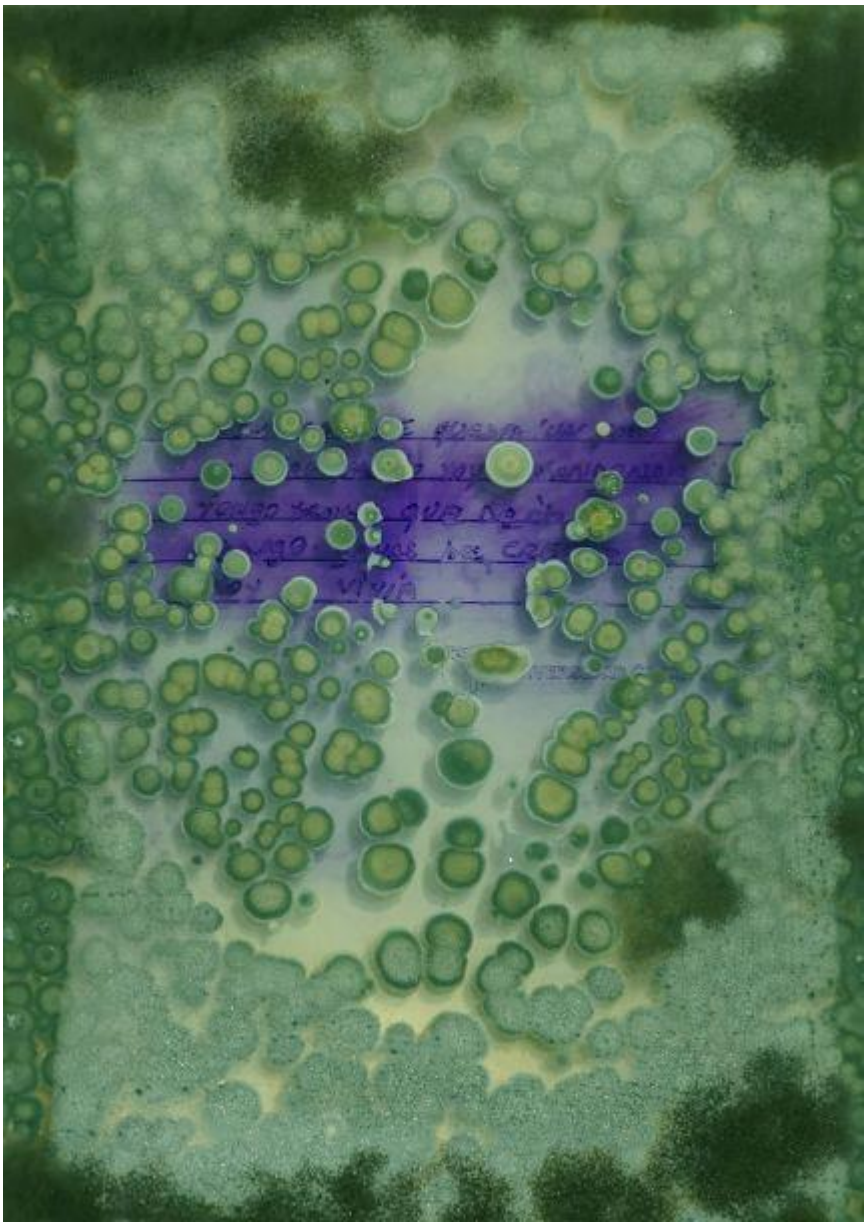

Figure 8. Juan Carlos León, *Kallumpakunamikan shunku*, 2021

Tomás Saraceno

Argentinian artist Tomas Saraceno created and installation called “Algo-r(h)i(y)thms,”[14] which conforms to a multiple set of strings arranged throughout the gallery space in a web-like pattern. These Strings are tense in such a way that touching them generates different sounds because of produced vibrations. Participants are invited to touch these strings and to produce sounds, and in inviting this action, Saraceno points to the idea of people embracing “responsibility,” dissecting the word into two, “response” and “ability.” His work shows how the action of responding to something creates awareness about the results or impact of a person's actions when interacting with the strings. Saraceno aims to create with his work experiences of different realities and the links between. In this case his draws inspiration from spiders, their rhythms, the way they operate and how, even though they are “blind” to our understanding, they are able to build such complex structures which are ultimately an extension of their own bodies, a materialization of their cognitive capabilities that they use to expand their perception of their surroundings and communicate with other species .

The artist is also interested in how spider webs could be related to other forms like cells, galaxies, cosmic dust, in an attempt to reveal or produce a sort of intercommunication. But also, he is concerned with the idea of entanglement and describes how when he was a young he had nightmares about not being able to disentangle things, about the existence of too many connections. This then developed into Saraceno’s interest in his art being a trigger to ecological awareness through the realization of the interconnectedness between species: “As spiders tell us, we are all connected through an apparatus we do not understand. Everything is entangled in an ecosystem. People should pay more attention to sense and listen to other voices.”[15] In this way, Algo-r(h)i(y)thms’ is a practice of rhythmic attunement to a non-human world.

Saracano describes his work as “an exercise in establishing a communication with something that is distant, inaudible, but which we are a part of.”[16] Similarly, in my

[14] “In Conversation With Tomás Saraceno, The Artist Who Wants Us To Enter A Non-Human World Of Vibration,” IGNANT, November 27, 2019, https://www.ignant.com/2019/11/27/in-conversation-with-tomas-saraceno-the-artist-who-wants-us-to-enter-a-non-human-world-of-vibration/.
[15] Ibid
[16] Ibid

work there is an attempt to communicate with something that is somehow inaccessible, but we are more closely related to what is seen in artificial neural networks, which are an extension of the functioning of our own brains or the fungi to which we are so closely connected to from a genetic standpoint.

Figure 9. Tomas Saraceno, Hybrid webs.

Bio/AI

Sofia Crespo

Sofia Crespo is a Berlin-based digital artist who uses machine learning techniques to create unnatural images of nature. Her work explores the potential of AI in artistic practice and its influence on creativity. Crespo's project, Neural Zoo (fig. 10), combines her fascination with the natural world and her interest in human cognition and creativity.

She creates her images by feeding datasets of various species into Convolutional Neural Networks and GANs, which then generate new combinations and visual representations. In her work, Crespo examines the relationship between nature and technology, as well as the ways in which AI can challenge our perceptions of reality. She hopes that her art encourages people to appreciate and care for the natural world, while also recognizing the positive applications of technology for self-expression and healing.

Figure 10. Sofia Crespo, Neural Zoo, 2020.

When asked about the relationship between nature and technology in her work she describes her process as one of learning and recombining::

> The fact that I'm using technology to learn about 'nature' in the broadest sense of the word, has an eerie quality to it, one I think will probably become less and less questioned by future generations. Maybe we're still in the phase where nature is

> 'the given world' and technologies are, well, 'the human-made adaptations to that given world', and we still make a distinction between them. . . . I find it interesting to recombine the objects observed that my brain classifies as 'natural' using technologies that are classified as 'artificial'. There's something about synthetic biology that fascinates me.[17]

Crespo's work is particularly relevant to me as she is one of the artists whose techniques and concepts are so closely related to mine, particularly her interest in using technology as a way to learn about nature and how nature and technology are too often considered separate entities. She is attempting to point out their entanglement, which I am also attempting to do when connecting artificial neural networks to mycelium networks.

Forensic Architecture

Forensic Architecture is a research agency based at Goldsmiths, University in London that investigates human rights violations, including violence committed by governments, police forces, militaries, and corporations. They use digital and physical models, 3D animations, virtual reality environments, and cartographic platforms to locate and analyze evidence, including testimonies from survivors of violence.[18]

[17] "NNN / Next Generation: AI Meets Human Creativity in Sofia Crespo's Neural Zoo," Next Nature Network, February 11, 2020, https://nextnature.net/magazine/story/2020/interview-sofia-crespo.
[18] "Forensic Architecture → Agency," accessed April 25, 2023, https://forensic-architecture.org//about/agency.o

Figure 11. Forensic Architecture. Gold Mining and violence in the amazon rainforest.

During the Bolsonaro presidency between 2019 and 2022 there has been a surge in illegal gold mining in the Amazon rainforest, resulting in destruction and violence against the indigenous communities living there. Forensic Architecture and the Climate Litigation Accelerator investigated the effects of Bolsonaro’s policies on the Amazon rainforest, the Yanomami people, and the violent attacks on Yanomami territory. They found that Bolsonaro's administration adopted policies that both directly and indirectly encourage gold mining on Indigenous land, and identified four strategies that support gold mining and undermine Indigenous sovereignty. The investigation shows that the violent attacks against the Yanomami people are carried out by gold miners and likely hired mercenaries, and that Bolsonaro's policies correspond in timing to the rapid increase in environmental destruction and violence against Indigenous people across the Amazon. The study supports the importance of upholding Indigenous land rights, which are crucial for both sovereignty and survival, given that those territories under Indigenous stewardship are among the best preserved areas in the Amazon rainforest, and deforestation in the Amazon is a major contributor to global climate change.

Their final work takes place in the form of an informative video that describes the situation in the Amazon, along with visual data of the problem and forensic architectures contribution to it.[19] Forensic's work methodology is so specific and their results such that they become useful tools that respond to practical applications with real life consequences. While in my work, I engage with the same research subject, I engage in a more speculative interaction that involves the use of living organisms to comment on such matters. By using speculative methods, my work establishes how slime mold growth can provide metaphorical readings on a particular situation.

Óscar Santillan

Visual artist, cybernetician, and writer who makes him home in both the Netherlands and Ecuador. His work is centered around the concept of "Antimundo," which he describes as a way to identify and generate realities that don't fit within the conventional world. Santillán explores alternative forms of knowledge production and imagination, drawing from cybernetics, science fiction, Andean and Amazonian cosmologies, a more inclusive history of science, and plant intelligence. He also incorporates emerging fields, such as AI and synthetic biology, which are currently disrupting traditional paradigms, to complement his "Antimundo" toolbox.[20]

In the interview "My Work Is a Reaction to the Idea of the Latin American Artist,"[21] Santillan addresses some of the questions surrounding the idea of the Latin American artist, which he describes as predominantly directed towards what he calls a "temptation of reality," mostly driven by the powerful presence of social conflicts that end up directing artists to react to them. These scenarios happen in an immediate layer of

[19] "Gold Mining And Violence In The Amazon Rainforest," accessed April 25, 2023, https://forensic-architecture.org//investigation/gold-mining-and-violence-in-the-amazon-rainforest.
[20] "Oscar Santillan," in *Wikipedia*, March 1, 2021, https://en.wikipedia.org/w/index.php?title=Oscar_Santillan&oldid=1009683678.
[21] "ARTPULSE MAGAZINE » Features » My Work Is a Reaction to the Idea of the Latin American Artist. An Interview with Oscar Santillan," accessed September 28, 2021, http://artpulsemagazine.com/my-work-is-a-reaction-to-the-idea-of-the-latin-american-artist-an-interview-with-oscar-santillan.

reality, which can make it difficult to perceive and confront other aspects of it. When one is moved by this immediate experience of reality it is easy to be caught in pre-existing narratives and categories that heavily condition our perception. Santillan is more interested in turning away from those discussions towards the territory of existence.

A great example of the way Santillan approaches his practice is his work "Solaris," which he describes in detail:[22]

> […sand gathered at the Atacama Desert was first melted, becoming glass. This glass was then turned into photographic lenses. These 'desert eyes' were brought back to the Atacama desert and used to photograph its landscape. The captured images go beyond representing the landscape; in 'Solaris', the desert is an observing subject rather than a passive object to be looked at. 'Solaris' takes its inspiration from the sci-fi classic of the same title, by Polish writer Stanislaw Lem, which explored a potential type of intelligence that does not derive from a brain, but, rather, from the sea of a distant planet called 'Solaris'.[23]

Figure 12. Oscar Santillan, Solaris.

Here we can see how in this work intends to locate intelligence beyond humans, and Santillan accomplishes this in a poetic but "real" way at the same time. His work was particularly inspiring for me, both conceptually and technically, as I see a similarity

[22] "PORTFOLIO+-+Oscar+Santillan+-+SOLARIS.Pdf," accessed December 17, 2021, https://static1.squarespace.com/static/532b1bcfe4b0b4a63cc3c506/t/60799594d6ee036f8aa1637d/1618580887973/PORTFOLIO+-+Oscar+Santillan+-+SOLARIS.pdf.
[23] "PORTFOLIO+-+Oscar+Santillan+-+SOLARIS.Pdf."

between his attempt to make the desert to see itself and my attempts to use artificial intelligence neural networks to represent themselves.

Mark Dion

Mark Dion's work explores how dominant ideologies and institutions shape our understanding of history, knowledge, and the natural world. He believes that an artist's role is to challenge perception and convention by going against the grain of prevailing culture. By tracing the roots of environmental politics and public policy in the construction of knowledge about nature, Dion questions the objectivity and authority of the scientific voice in contemporary society. He also examines how pseudo-science, social agendas, and ideology can infiltrate public discourse and knowledge production.[24]

His retrospective exhibition, "Theatre of the Natural World," at the Whitechapel Gallery, includes a phosphorescent wunderkammer, zebra finches soaring within a massive birdcage fit for humans, and a display case containing intriguing objects unearthed from the Thames' shores.

In an interview with Jane Simpkiss, Dion discusses his fascination with "Wunderkammer," or cabinets of curiosities, from the 16th and 17th centuries, rather than the more general term "cabinet of curiosity." He appreciates the idiosyncratic nature of these collections, which combined natural and artificial objects before scientific or disciplinary categories existed. Dion suggests that Wunderkammen can serve as a model for modern museum displays, offering interactive and heterogeneous experiences that inspire wonder and curiosity in viewers.[25]

Dion also emphasizes that his work is more focused on the history of science

[24] "Mark Dion," in *Wikipedia*, April 21, 2023, https://en.wikipedia.org/w/index.php?title=Mark_Dion&oldid=1150961742.
[25] "Curiosity, Collecting and Cabinets - An Interview with Mark Dion," The Courtauldian, April 2, 2018, https://www.courtauldian.com/single-post/2018/04/02/curiosity-collecting-and-cabinets-an-interview-with-mark-dion.

than heritage or science in general. When asked about the original purpose of Wunderkammen, Dion explains that the enigmatic nature of these collections is part of their appeal, as it is difficult to determine whether they were intended for scientific, magical, religious, or commercial purposes.[26]

Mark Dion's work is particularly relevant for me as he is engaged in using tools associated with knowledge production and dissemination in order to establish new ways of understanding these activities through aesthetic experiences. In my work, I also employed the use of cabinets, flat files and documents like blueprints to frame speculative thinking about artificial neural networks and fungi. My engagement in a critical commentary regarding the nature of these tools which will be discussed further in the next section.

Figure 13.Mark Dion, The machines of the capital.

[26] "Curiosity, Collecting and Cabinets - An Interview with Mark Dion."

Methodology: Speculative Collaboration

Speculation as a place for art production

Speculation is my method of engaging with the complexity inherently embedded in the systems I was working with. Speculation allowed me to engage in imprecise thinking and to arrive at a form of knowledge that can only be inferred by engaging in the implausibility of going beyond human knowledge. When looking to how others define such term, it becomes relevant to review the work of Anthony Dunne and Fiona Raby "Speculative Everything" where they say the following:

> What we are interested in, though, is the idea of possible futures and using them as tools to better understand the present and to discuss the kind of future people want, and, of course, ones people do not want. They usually take the form of scenarios, often starting with a what-if question, and are intended to open up spaces of debate and discussion; therefore, they are by necessity provocative, intentionally simplified, and fictional…] [...We believe that by speculating more, at all levels of society, and exploring alternative scenarios, reality will become more malleable and,although the future cannot be predicted, we can help set in place today factors that will increase the probability of more desirable futures happening. And equally, factors that may lead to undesirable futures can be spotted early on and addressed or at least limited.[27]

While some people within the design field define the speculative as possible futures I would temporarily define speculation as a method to use empirical data in order to arrive at uncertain results; this is different from imagining, for instance, as the latter

[27] "Speculative Everything," MIT Press, accessed May 1, 2023, https://mitpress.mit.edu/9780262019842/speculative-everything/.

allows us to envision things that belong to the realm of certainty, while under my definition speculation uses data that is uncertain while embracing uncertainty in order to create futures or outcomes that do not respond to questions related to plausibility.

In the book "The Exform,"[28] art curator Nicolas Bourriaud explores contemporary art, politics, and aesthetics through the concept of the "exform." This concept refers to the marginalized and excluded elements in society that artists transform into the substance of their work, breaking away from traditional hierarchies of value and engaging with the world in new ways. In this context, I believe that the idea of speculative knowledge aligns with Bourriaud's approach, as it offers an alternative and integrated path of dealing with nature and technology. By emphasizing the importance of speculation and experimentation, Bourriaud encourages artists to create new forms of meaning and value that challenge established norms and foster critical reflection on societal issues. He states, "The speculative capacity of art is revealed in its ability to create links between realms of reality that were not previously connected, by imagining possible combinations and activating them."[29]

But my approach to speculation involves an even greater conjectural element. I realized that a speculative practice that collaborates with the agency of systems that are beyond my ability to control and understand would actually allow me to engage with levels of uncertainty beyond my cognitive capacity.

My collaborative approaches to speculation therefore allow me to explore the process of relinquishing personal expectations resulting from the inherent inability to control specific outcomes. This phenomenon is particularly evident when working with living organisms, such as fungi or slime molds, due to their innate autonomy as well as in the context of artificial neural networks, which made them ideal collaborators.

These collaborative methods enable me to engage in a negotiation game, in which I have to adapt and adjust my expectations based on the realities of the research subject. In the case of living organisms, their unique characteristics challenged my

[28] Nicolas Bourriaud, *The Exform*, Verso Futures (London ; New York: Verso, 2016).
[29] Bourriaud.93

ability to manipulate and control their behavior as these organisms often exhibit unpredictable growth patterns and responses to environmental stimuli, necessitating a more flexible approach to experimentation and analysis. Similarly, working with artificial neural networks (ANNs) presented its own set of challenges in controlling outcomes as ANNs are complex computational models that can learn and adapt over time, making their behavior and outputs difficult to predict or control. I often encountered unexpected results when training and testing these models, as their learning capabilities and inherent biases can lead to unforeseen consequences.

By embracing this collaborative mindset and acknowledging the limitations in controlling certain aspects of the creative practice, a deeper appreciation for the intricacies of living organisms and artificial neural networks emerged, promoting more effective experimentation and discovery that disrupts the ability to achieve results that are certain.

Speculative Collaboration with Organisms

With my research question clear and my methodology identified, I began to try different material and aesthetic approaches by experimenting with other organisms like scoby, a symbiotic culture of bacteria and yeast commonly known to be used in the preparation of kombucha. I was able to culture a huge scoby that subsequently was used in some of the works. (fig. 14)

Figure 14. Scoby culture

During my exploration of the intersection between natural and artificial elements, I embarked on a journey to learn how to cultivate various types of fungi at home (fig. 15). This process allowed me to gain a deeper understanding of the unique characteristics and growth patterns of these organisms, as well as their potential for integration into sculptural objects.

I also researched different methods of fungal cultivation, focusing on the specific needs and requirements of each species. I set up a controlled environment, ensuring that factors such as temperature, humidity, and light were maintained within the optimal range for fungal growth. Through trial and error, I eventually refined my technique and successfully grew different types of mycelium fungi, including oyster mushrooms and reishi, among others.

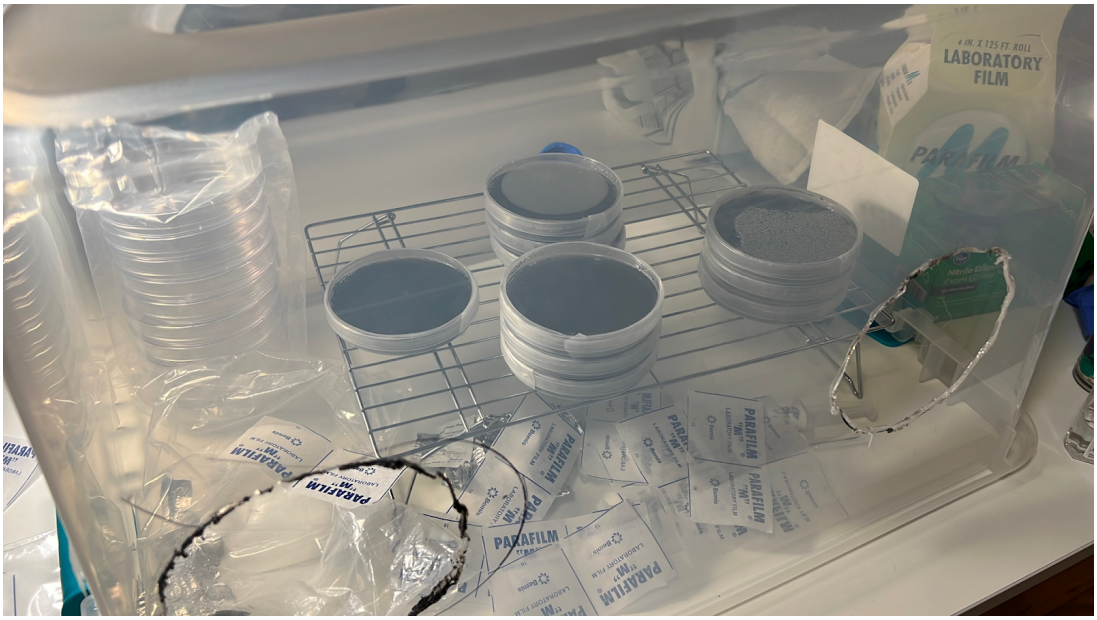

Figure 15. Home lab setting

Figure 16. Hybrid sculptures experiments.

In my pursuit of pushing the boundaries of traditional artistic practices and engaging in speculative thinking, I intentionally disregarded the conventional sterilization methods typically associated with the cultivation of fungi and other organisms (fig 17.) This decision to deviate from established protocols allowed me to create an environment in which unexpected interactions and developments could unfold, fostering a rich and dynamic ecosystem that embraced the unpredictable nature of life.
By allowing other organisms to grow alongside the fungi, I aimed to explore the complex relationships between various forms of life and observe the emergent properties that arose from their interactions. Furthermore, the presence of additional organisms challenged my preconceptions and compelled me to adapt my approach by stopping to care for strict scientific methods of proper sterilization that were not relevant for my interests as I was not looking for provable knowledge, deepening my understanding of the interconnectedness and complexity of living systems. In this way, the adoption of collaborative methods and the letting go of personal expectations were crucial within my research area involving living organisms and artificial neural networks. Acknowledging the limitations in controlling the outcomes allowed me to adapt my approaches and ultimately gain an expanded understanding of these complex systems that was beyond empirical reasoning.

Speculative Collaboration with objects and ANNs

In parallel with my experimentation in cultivation, I sought to recontextualize the tools and methods traditionally associated with knowledge production and its dissemination, utilizing them as a means to frame my speculative thinking (fig 18), from using “scientific” equipment and methods, to using historical museological display techniques and “informative” documentation such as fungi specimens images.

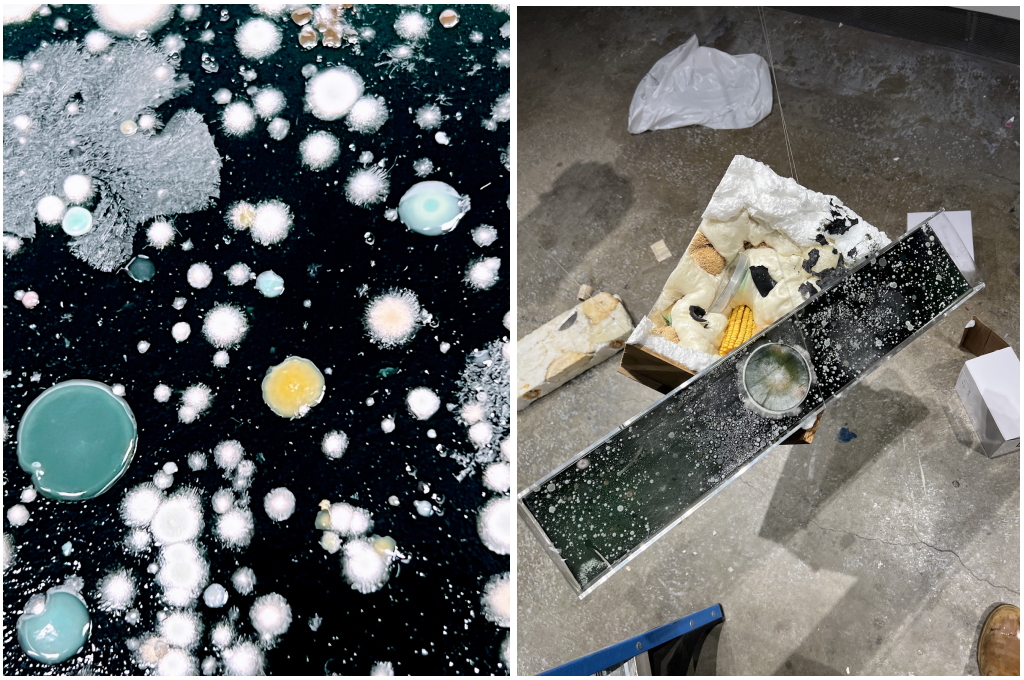

Figure 17. Bacteria and other organisms growing in agar.

Figure 18. 1st year MFA show work

After numerous iterations and experiments, my vision for the final project began to take

shape. I decided to create hybrid forms that combined mycelium with artificial neural networks, taking advantage of the latest machine learning algorithms that had become publicly available through user-friendly web-based artificial neural networks, such as Midjourney and DALL-E[30]. These tools facilitated the fusion of biological and digital elements, enabling me to generate unexpected, hybridized outputs that cannot be repeated. In Fungi, uniqueness arises from countless environmental stimuli, while AI-generated images are shaped by complex algorithms, data inputs, and randomization that leads to one-of-a-kind patterns and features. The non-linear nature of AI algorithms also means that small input changes can cause significant output differences, making it challenging to reproduce the same image. Furthermore, AI models constantly evolve as researchers refine techniques, which can result in unique images from different algorithm versions, even when trained on identical data.

I began by using Midjourney and DALL-E to generate a series of 2D images based on my input data, which consisted of visual representations of mycelium structures and patterns related to artificial neural networks (see fig. 19). These web-based tools, powered by advanced machine learning algorithms, synthesized the provided data to create novel and unexpected visual outputs that integrated the organic and artificial elements.

Once I had an array of compelling 2D outputs, I proceeded to transform these images into 3D models using specialized software and digital sculpting techniques (see fig. 20). This conversion process allowed me to further explore the interplay between mycelium and artificial neural networks, as well as the spatial and structural relationships that emerged within the hybrid forms.

With a collection of 3D models in hand, I then explored various options for 3D printing them, experimenting with different materials like resin and clay (see fig. 21). Throughout the entire process, from the initial digital synthesis of mycelium and artificial neural networks to the final 3D-printed objects, I continually refined my concepts and techniques basing my criteria on how these were addressing my research questions.

[30] Artificial neural networks

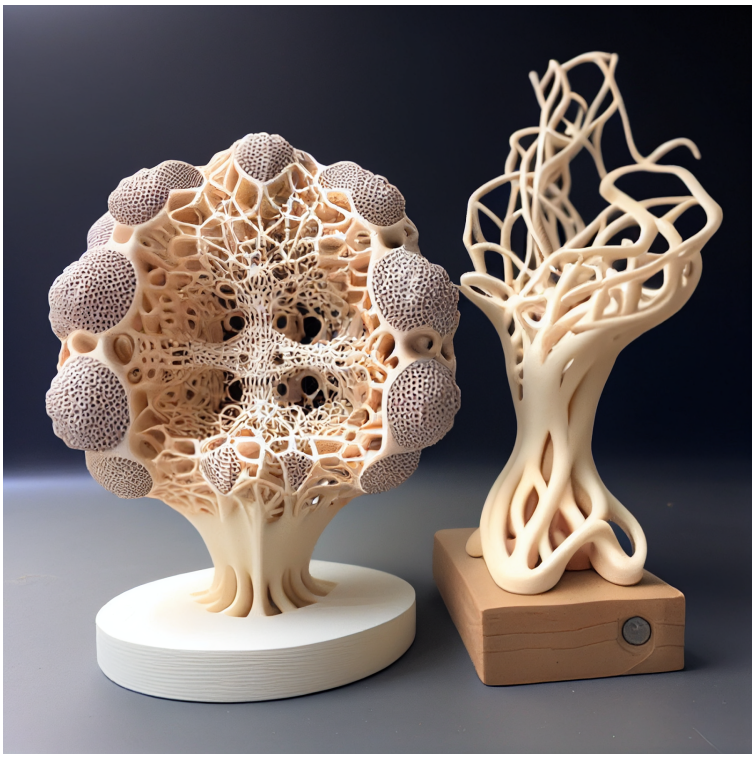

Figure 19. AI 2d image of mycelium-neural network hybrid

Figure 20. 3D model out of 2D image of mycelium-neural network hybrid

Figure 21. 3d models printed in resin (left) and clay (right)

Simultaneously, I started to create visual diagrammatic representations of the

dialogue between the neural network and the mycelium networks, as a way to further explore their interconnectedness and the potential for symbiosis between these two complex systems. To achieve this, I used machine learning algorithms to generate diagrams that illustrated the intricate relationships and exchanges occurring between the digital and biological realms.

Once I had generated these compelling visualizations, I decided to blend this cutting-edge technology with a historical photographic development method known as cyanotype, a technique dating back to the 19th century which involves the exposure of light-sensitive paper to UV light, resulting in striking blue images. By using this vintage technique, I sought to create a tangible connection between the past and present.

The result was a series of striking images (fig. 22) that showcased the dialogue between the neural network and the mycelium networks, capturing their intricate interplay.

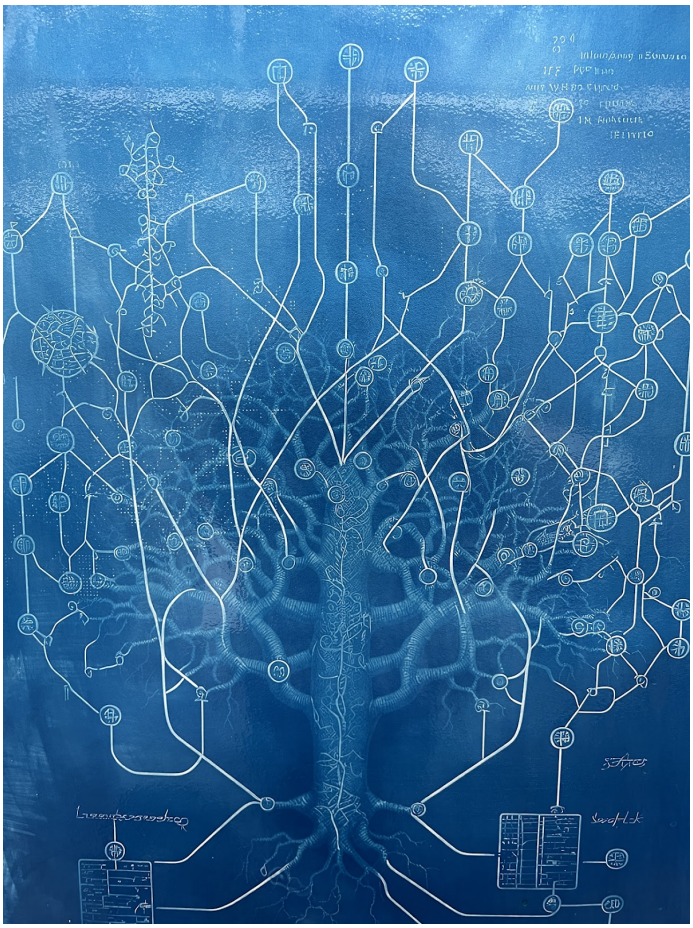

Figure 22. AI image transferred to a cyanotype

Figure 23. First attempts to display the final work.

In an effort to reintroduce the agency of living organisms into my creative process, I was also inspired by the fascinating characteristics of a fungal-like unicellular organism known as slime mold. Scientists often study slime mold as an example of primitive intelligence, as it exhibits remarkable abilities in finding efficient ways to connect various points. To further explore the potential of this organism in my work, I reconnected with the mycology department and was granted access to their laboratory.

Throughout the project, I felt a growing urge to intertwine these speculative interactions with a pressing real-world issue. As the child of two geographers, I have always been deeply interested in the study of territories and have closely followed the alarming situation in the Amazonian Venezuelan jungle. This region has been subject to illegal mining activities, with the tacit support of the current political regime. Such activities have had devastating environmental and social consequences, and I became determined to use my speculative methods as a metaphorical gesture of commenting on these issues.

To initiate this goal, I collected satellite images of the affected Amazonian areas and identified the locations of the mining activities. Using these images as a guide, I

placed nutrients on agar plates, corresponding to the mining sites, with the intention of populating the space with slime mold. As the slime mold grew and expanded, it established connections between the nutrient points, taking over the surface area of the petri dishes and obscuring the visibility of the satellite images. This would take a more elaborated aspect towards the final work.

Display/Dissemination

With my speculative collaborations completed, I turned my attention to the presentation and framing of these works. I experimented with various display methods, such as mounting the prints on wooden panels or enclosing them in glass cases (fig.23), I experimented with display cabinets, academic metal cabinets, acrylic display cases, industrial fridges, etc. in order to find the most effective way to invite viewers to engage with the thinking of such objects as a different kind of knowledge indicators in a way that each of the pieces would allude to similar but slightly different ways of understanding the work.

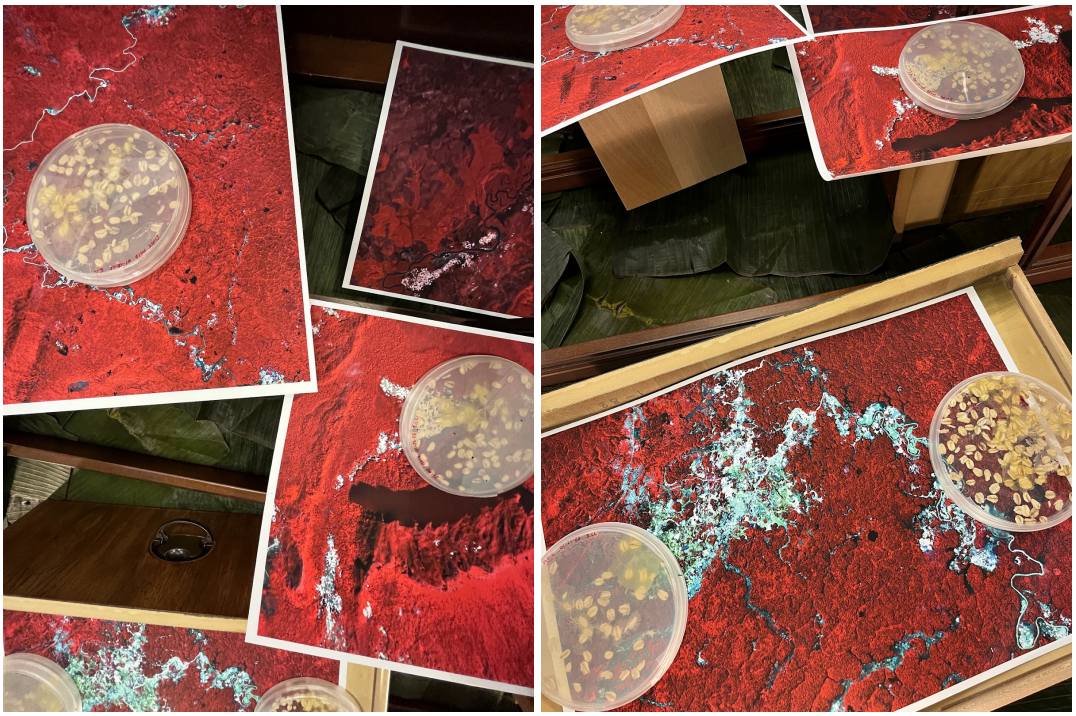

Figure 24. First attempts to connect slime molds with satellite images of mining activities.

Los últimos santos

The thesis exhibition work consists of a series of archives, specimens, and objects that explored the complex relationship of nature and technology, as well as the way they have shaped knowledge production historically. It explores the speculative interactions between fungi, slime mold, and machine learning processes while addressing particular problems such as illegal mining activities in Venezuela. The work serves as an attempt to look for alternative, more integrated methods of knowing and interacting with nature and technology in response to dominant ways of knowledge production.

There are six stations in the exhibit, each of them addressing some particular aspects of the concepts that were introduced in the previous sections. At the gallery, the didactic descriptions of all the objects are initially hidden from the viewer and information about the objects is accessible by scanning a QR code that leads to more details about the work.

The pieces are situated in a low light condition environment within the gallery space. This decision was made in part to allude to natural history museums that I used to visit when I was growing up in Venezuela as the methods of display and scenarios created for the viewers made objects acquire a dramatic characteristic of truthfulness. But it is also worth mentioning that fungi like growing in low light environments. The work can be divided into two different attempts: The first one frames the speculative thinking by subverting the tools of knowledge production (stations 1- 4), and the second addresses a particular problem with such speculative methods (stations 5-6).

Figure 25. Overview of the installation

Framing the speculative

The work is subdivided into the following representational categories: diagrammatic, digital and physical.

Station 1: **The Diagrammatic”**

The work showcases a collection of cyanotypes and UV prints on copper-plated aluminum sheets, housed within a wooden vintage display cabinet and a metallic file cabinet. The blueprints are arranged haphazardly in the cabinets, making it difficult to distinguish them as individual pieces of information. They were created using machine learning processes, with prompts such as "a diagram of a mycelium network and an artificial neural network having a conversation" or "a diagram of a mycelium network and an artificial neural network hybrid."

The intention behind this particular body of works is to explore the speculative interaction between contrasting systems by employing tools intrinsically linked to objects considered as traditional repositories of knowledge, such as blueprints and cabinets. By framing these fictional elements with aesthetic characteristics that could be interpreted as museological, I aim to propose alternative methods of understanding and engaging with technology and nature that challenge the prevailing dominant notions of material progress.

Figure 26. Detail of the installation

Simultaneously, the visual elements exhibit an inexplicable organic quality that entices viewers to question whether the display is real or imagined, and whether it can be rationally understood. Ultimately, the inherent nature of the elements used in this work resides in a realm of uncertainty. Consequently, even with an abundance of information about their nature, the possibility for complete understanding remains limited.

Figure 27. Detail of the installation

Station 2 : **“The digital”,** three 40-inch TVs are seamlessly integrated into the drawers of a vintage wooden flat file. The TVs display videos created by machine learning algorithms, visualizing possible interactions between mycelium networks and artificial neural networks. Unlike the diagrammatic representations featured in the display cabinet, the outputs in this piece closely resemble a virtual 3D render, offering a moving portrayal of these complex systems interacting.

The flat file serves as a symbol of the convergence between the analog and digital worlds. The digital data presented on the screens replaces traditional analog forms of data transmission, such as documents, maps, and blueprints. The drawers are purposefully arranged to reveal only certain sections of the video content, alluding to the intricate nature of the systems depicted.

Figure 27. Detail of the installation

One of the videos displays a command window that tracks the progress of the machine learning model as it is trained. This creates the illusion that the other videos within the installation are being generated live, adding an element of intrigue. However, in reality, they are pre-recorded. By incorporating this element, an additional layer of fiction within the piece is introduced, blurring the lines between fact and fabrication.

In station 3-4 **“The physical”** the clay 3d printer is placed in vintage wooden furniture, given the novelty of the technology used in combination with an object from a past period of time there is sentiment of rarity that makes harder to the viewer to identify itself within an specific time period, such condition repeats in several of the other pieces as well.

The printer is activated during specific times of the installation, so viewers can have the opportunity to watch the printer creating these mycelium-ai hybrids. This

introduces a time element into the reading of the work where questions of whether the pieces are new or old as well as about the nature of their materiality, as clay 3d printers are objects still too novel for people to easily recognize them. The presence of the clay 3d printer challenges viewers to question the reality of the rest of the elements presented in the space as there are similar pieces located within other stations. .

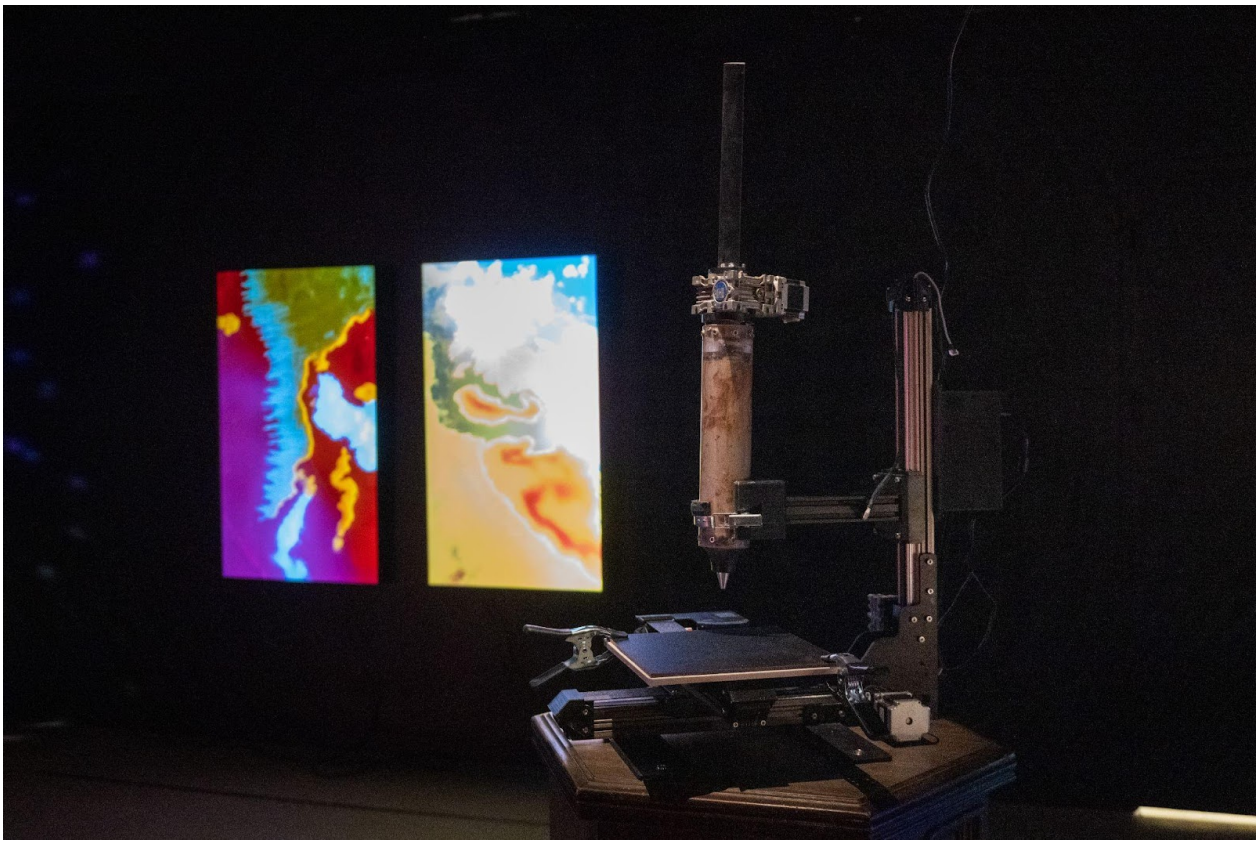

Figure 28. Detail of Station 3, Clay 3d printer over vintage wooden tables.

The other display consists of one refrigerator and two laboratory incubators (fig. 29), instruments used in scientific research facilities in order to let organisms grow and to preserve their life cycles. In these containers, only objects useless for scientific purposes are presented. This section contains all the hybrid specimens that I created with 3d printing in combination with real fungi and other molds growing on top of the clay pieces. Such “specimens” acquire different connotations depending on the container they are placed in: in the incubators there is an allusion of something that is being created or grown the temperature of such equipment is set to 29 degrees celsius which are ideal conditions for many fungi species to grow, and they allude to the present and the future. On the other hand, the “specimens” in the fridge refer to something that is

being preserved or stopped in a determined state; they allude to the past but a past that is unknown.

Figure 29. Detail of station 4. The physical, real and artificial specimens in incubators and refrigerator/

Speculating the particular

Station 5 : As I wanted to address the mining problem in Venezuela with the tools I was using, I trained machine learning models from the satellite images of the mining activities and combined those with prompts like *“a neural network and slime mold*

network intervening in illegal mining activities in Venezuela". The final result are video animations placed in two 65" Tv's positioned vertically in the walls of the space.

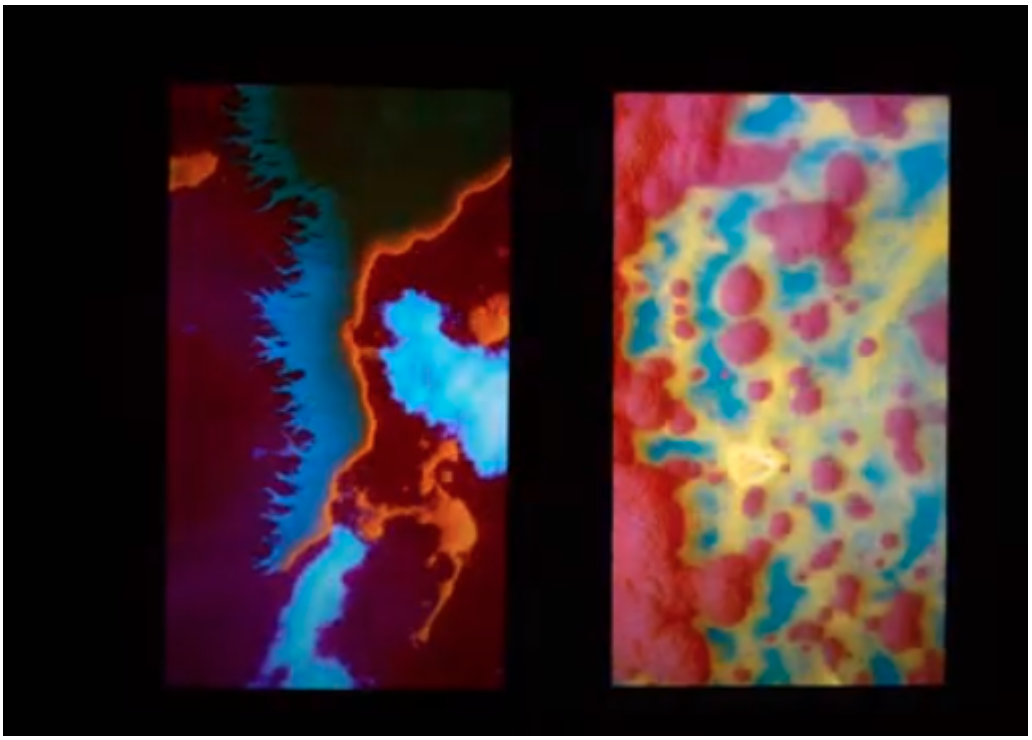

Figure 30. Detail of the installation

In a similar attempt, I wanted to use the satellite imagery data from the illegal mining activities in Venezuela to propose a dialogue that could be real and speculative at the same time. By placing nutrients (oatmeal) in a petri dish in areas that correspond to the affected areas visible in the images I placed an initial culture of slime mold so it could grow and use these nutrients to make different connections visible to the eye, the slime mold ends up covering almost the entire surface area making the original image to be indistinguishable. Both actions[31] present a data visualization that doesn't lead to any functional knowledge, but it proposes at least two main different speculative readings of a particular situation: the first one would be to think about the slime mold / AI as a sort of regenerative agent that by feeding from the contaminants generated by such activities ends un covering and recovering the soil in order to allow

[31] Stations 5-6

new biological life to occur. The second one would be to use the slime mold / AI growth as a tool for visualization of the consequences of illegal mining activities in the future, where the contamination extends all over the territory. This multidirectional reading of the slime mold's growth and decay refers to the incapacity to attain empirical knowledge about these two complex systems and their metaphorical interactions; this is not an attempt to make a statement but to raise questions and concerns regarding the intricacy of the matter with the use of an organism fitted with an intelligence different from human and a technology created by humans but whose properties and potentialities are yet to be discovered.

Figure 31. Slime mold culture in petri dish over satellite image of illegal mining activities in Venezuela

Limitations and conclusions

The limitations I encountered in addressing specific issues, such as the mining activities, serve as a starting point for further exploration and deeper analysis in future iterations of my work. Additionally, I aim to address other aspects related to the technologies I utilized, including the biases inherent in artificial intelligence systems, the dominance of the English language, and the lack of data from sources outside the realm of the internet. These concerns reflect the broader challenges faced by contemporary artists and researchers as they navigate the complexities of a rapidly evolving technological landscape.

Curator Dan Cameron said after his visit to the exhibition that he felt "stupid" while looking at my work. When given the opportunity to discuss this with him, I shared that I, too, often feel dumb by the complexities of the systems I work with, given that I am not a professional in fields like biology, computer science, 3D modeling, or 3D printing. However, this lack of expertise became an advantage, as it allowed me to approach these subjects with a sense of freedom and curiosity that might not be possible otherwise. This open-mindedness encourages experimentation and fosters a spirit of collaboration that transcends disciplinary boundaries.

Some questions emerge from all these interactions: How might the methodology of speculative collaboration contribute to contemporary art by proposing integrated visions of natural and artificial systems while challenging conventional ways of dealing with these systems? In what ways do the speculative methods utilized in artistic practice allow for diverse interpretations and promote discussion and reflection on the definition of intelligence, the potential benefits and hazards of emerging technologies, and their impact on our world? How might the artwork and methodology of speculative collaboration be categorized in a way that acknowledges the improbability of fully

understanding something? How might the artwork and methodology of speculative collaboration push the boundaries of traditional artistic expression and catalyze critical discourse and reflection on the increasingly complex and interconnected world in which we live? The more I engage with such systems in their multiple combinations, the more questions I have, questions that given the nature of my methodology will be left unanswered or that will follow up with further ramifications of inquiries.

One observer commented that the objects I created felt "suspicious," and I find myself experiencing similar sentiments the more that I examine them. This sense of uncertainty is a testament to the effectiveness of my speculative collaboration methodology, as it encourages viewers to confront the uneasy relationship between natural and artificial systems and question the preconceived notions that often dictate our understanding of these domains. I would like to continue in my quest to speculate with other non-human entities that allow me to think of different uncertain scenarios for the things I am concerned about. The others from which the only thing I am sure about is that of our shared complexity.

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