Matej Vakula: The Lab, The Studio, and The Source Code
Interview with Matej Vakula
By Lindsey Berfond
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Lindsey Berfond: Your art practice crosses a number of disciplines, photography, sculpture, social practice, biological research, computer programming, urban studies and architecture, but a methodological thread or crux that runs across your work seems to be an interest in knowledge production, and importantly, the breaking down of traditional systems for pursuing and developing inquiry. Could you speak to the role knowledge production generally plays in your work, as well as the influence of open source methods, (bio)hacking culture, and DIY science communities?

Matej Vakula: A lot of my work, if not all of my work, involves different observations or different approaches to knowledge production and distribution. I think of hacker spaces as ideal places for sharing alternative knowledge outside of formal institutions or schools, where open source methods become a means to avoid hierarchy and stringent power structures. The origins of these collective spaces were, of course, centered around the democratization computer programming and electronics, but have since evolved to include many other forms of machining and DIY culture. A few key examples that have been of influence to me include c-base, Metalab, NYC Resistor, Brmlab in Prague, and Progressbar in Bratislava. Of particular interest to me now are hacker spaces that focus on biohacking such as Bosslab in Boston, Lapallais in Paris, and most importantly Genspace in Brooklyn, of which I am an active member. Genspace is a Biosafety Level One community lab that provides community access to biotechnologies and citizen science education and supports biotech startups and artists interested in experimenting. Prior to working with Genspace I was also a researcher at Public Laboratory, which is a larger network of communities focused on environmental concerns and open source technologies that can be mobilized to help communities respond to these concerns. Both places are more or less involved in communal bioremediation efforts, and vital resources for my work. I've seen how this open sharing of knowledge, which is often reserved for ivory tower facilities, can be channeled towards community improvement and empowerment. Both Genspace and Public Lab are focused on making scientific equipment more accessible and affordable for anyone interested, and seeing the benefits of this access has been a big influence on my own projects.

LB: It's interesting you bring up these alternative spaces, because I think what is so fascinating about your work is the way you operate between the biohacking community and traditional scientific institutions, as well as the more linear, hypothesis-driven processes that are associated with them. Perhaps you could speak to how your residency at the Center for Molecular Imaging and Nanotechnology, within Sloan-Kettering Cancer Research Center came about? Do you see our work in chemist and engineer Daniel Heller's lab as an intervention or collaboration?

MV: The residency was partially a happy accident. After meeting Dan at Genspace, he invited me to come to the lab and visit. During that first meeting I proposed some of my new project ideas and it clicked with the research they were doing at the lab. I would say the work we're doing there now is collaborative in nature. For Sloan-Kettering and Dan, there is a desire to better broadcast or communicate the work being done in these closed laboratories, which is also a really interesting challenge for me: to translate this quite complex information that is generated there and show it to the public. It's also an important exercise to consider in my work, to examine the culture of the lab as not outside of, but interacting with a larger culture and society, even a larger politics and economy.

LB: What are they working on right now in the lab? Do the scientists influence your practice and vise versa?

MV: The main focus in the lab is on this nanoparticle research, and nanoparticle-based drugs. The nanoparticles target tumor cells and when tissues harboring the nanoparticles are exposed to infrared light, the particles produce free radicals that kill the cancer cells. I started at the lab as an artist with some knowledge of DIY science and scientific methods, but I had to learn a lot at the start about their approach and their methods. This really influenced how I would realize my own projects, trying to bring relevance to the work being already done in the lab and potentially advance it.

LB: Sounds very different from a more fluid and solitary studio practice. It's also interesting to think through what a truly reciprocal artistic practice can look like in the laboratory, especially in a time when social practice artists are often taking more from their short-term engagements with different communities or disciplines than they are giving back.

MV: Exactly. In this case you are really part of a team and you have to think about what you are bringing to the team - what are you giving them, and then what are you giving your audience as well. Yet at the same time you have to be really kind of precise about what you're doing and the accuracy of the information you are conveying to the public.

LB: There's a certain level of accountability in the work you're doing, a responsibility to hold yourself to the same standards as the scientists you're working alongside. At the same time, your perspectives and goals as a biohacker, programmer, and artist can differ quite a bit.

MV: These things can definitely come together though. While trying to pinpoint the exact parameters for creating analog photographs of petri dishes in my most recent project *Well Plate Utopias* (2016), we found that the optimal laser wavelength for the photo-bleaching is also the optimal for cell killing. This would have implication for photo-dynamic therapy for cancer. The project was based on tissue cultures and drug testing on a massive scale, so the project really focused the team on getting a precise reaction without burning the tissue.

LB: Could you talk about how you got started with *Well Plate Utopias*?

MV: So one of the major things that they do in the lab is developing and testing new photo-thermal therapy drugs, which basically are composed of two parts: one is the cancer drug itself, and one is a nanoparticle, which is the vehicle for the drug. If it's successful, the hope is that this localized cell therapy could replace the more harmful chemotherapy treatment. In starting *Well Plate Utopias*, I recreated the testing process for these new drugs by growing a monolayer of tissue in a petri dish, adding the drug, and shining an infrared laser onto the dish.

LB: What was the relation between the infrared light and the analog photography process? And how did you land on Sir Thomas More's 16th Century text *Utopia* as an influence for the photographs' subject matter?

MV: The infrared laser activates the drug, and I was thinking that this reminded me of analog photo processing, where you have a paper - in this case a tissue - that reacts to a light source, so what if I could put some sort of film in between the two to project the image? I came to More's conception of *Utopia* in relation to the role of the laboratory in society, as a physical location where the future is produced, where new technologies are born that will come to influence our bodies and culture. More's alphabet, the basis for the spoken language on the island of Utopia, also becomes a way for the findings in the laboratory to trickle out to the public. I developed a font for the project that is open for anyone to use, to communicate feedback back into the lab. Often the release of information out of the lab is one sided, so it's nice to have the *Well Plate Utopias* project become a way for people to reply back to the scientists.

LB: Thinking about the importance of language in your work—not only in *Well Plate Utopias* but across your projects with Artificial Intelligence, coding, and DNA—your approach often involves some kind of instruction-based precedent, an "if...then" moment. Yet, at the same time, there is the high value you place on the open source systems, leaving them open to modification, to be hacked. This is particularly true in your most recent workshop and performance project *Exercise 1.0 - The Beta Version* (2016) in which you and your collaborators attempt to break down or expose the algorithmic limits of the Polish constitution and the conditional power of the government to remove certain freedoms.

MV: I certainly like to observe language in its various different forms and think about the potential of language to develop systems. With every project I usually start by mapping the most suitable system to research an idea, question, or issue. From the results of this research I create a concept or a conceptual framework for the artistic project. The artwork that emerges becomes a way of communicating or interacting with an audience. Instructions and prompt-based conceptual art are very similar to computer programming language, algorithms, and mathematics, and I like to test this liminal space between these two formats. It's interesting for me to consider the connections between the Fluxus score, and the instructional format that has been present since early works by Duchamp, and how this sensibility has evolved through to today, particularly in the relationship between self-replicating instructions and artificial intelligence. If we look at instructions as something that can

serve as a framework for creating an artwork, it can be a way to actually crack open the source code and introduce new ideas and approaches.
For instance, using repetition to direct and drive the development of an artwork, we can introduce variables, objects, and elements from programming, artificial intelligence, and deep learning to create a self-evolving, independent concept that is no longer dependent on an artist. Such an independent concept can actually live on it's own and also learn from its environment. I know it might sound a little extreme but certainly the potential is there. What if open source methods could be applied to instructional and neo-conceptual art? The idea of open source opens up the concept of an artwork to constant modification by anyone, at any time.

LB: In a very basic sense, language is almost a medium for leveling the playing field between human and machine, and can be a way for artworks to address this as well. I wonder how you consider this relation in your works which examine the ultimate predictive form of language, the human DNA code.

MV: Yes, when language is thought of in this way, it can produce flexible approaches to collaborations between human, thing, and machine. What's also fascinating is that these collaborations can be anonymous and durational, cycling in and out of active participants over time. For me, it is not only working with thoughts or concepts for artworks and computer language but it is interesting also because it allows me to observe that language and instructions are the base for the origins of life itself—that is DNA. DNA is a set of instructions made by nature on how to build organisms, but one that has become accessible as a result of scientific advancements. I often think about how my hacker approach to art could be introduced into a DNA code, intervening directly into biological codes.

LB: But what the adaptability of DNA opens up is the question of ownership and capital, something that open source technologies try to avoid. Human language is also far from neutral and can be tied to structures of power and oppression in a way that has very material effects, which I think is important to consider here. **How do you grapple with these realities when conceiving your work?**

MV: I think that open source is actively trying to democratize anything that it is involved in, trying to radically eliminate the notion of ownership and allow the public free access, whether to a DNA code, a work of art, or even a space where people gather or live. However, I understand that sometimes technology, and also what is produced in the laboratory, is incorrectly framed as autonomous or not involved with politics. Scientists prefer not to think about how their discoveries have political consequences. That's what comes to fruition in the moment when the discovery in the lab turns into technology. For example, when you figure out how to break an atom, that technology allows you to produce energy, but it can also be turned into a weapon.

LB: Yes, and on the level of DNA code and social politics, there is institutional racism embedded in the history of some of this research. I'm thinking of individuals like Henrietta Lacks, an African American woman whose cancer cells were removed from her body in a public hospital for widespread testing without her permission. This happened in the 1950s, at a time when it was legal to do so in the United States, but the cells are still being replicated and used today for

cancer research without any compensation to the family, even though many of the bio-medical programs that use her cells receive extraordinary grant funding.

MV: Yes, I think her cells were a major breakthrough at the time in that they were one of the first which were able to successfully grow or replicate in a laboratory setting. That's the reason the He-La line of cells actually started to be so ubiquitous in the medical research community. It's definitely important to keep in mind the power structures inherent in these materials whether it's DNA or cancer cells in the lab. In the case of Henrietta Lacks, her body was being sold as a commodity, but legally there is an argument that if these cells are now outside of or extracted from you, is it still considered a part of you? It pushes the whole idea of a body, the integrity of a body, to a completely different level. And then as you mentioned, it becomes a question of ownership, who owns the rights to this material, if it's considered to be no longer part of a body, a citizen.

LB: Right, and I think the relationship between technology and the body, is so integral in your work because they are not taken to be a dichotomy, but instead considered intimately connected. As we move into a new realm of hyper-connectedness with technology, even a dematerialization or augmenting of the body, maybe you could talk about your recent work with artificial intelligence and nanotechnology?

MV: In *Nano Construct* (2016) am creating these 3D printed human scale models/sculptures of nanoparticles and cancer drug molecules, but the impetus for this had a lot to do with the ability of a human to understand scientific discoveries made by artificial intelligence. What they are developing at Memorial Sloan Kettering, and many other bio-medical institutions around the world, is a fairly new method of scientific discovery or knowledge production, which is even not based on humans, on scientists, but on A.I. .It's called computational chemistry. Basically, you have a computer which has a certain level of artificial intelligence, and you feed the computer sets of data, which in our case, each set of data has pairing of a type of cancer drug with a type of nanoparticle. So either the computer determines that the pairing is compatible and effective in the creation of a nanoparticle cancer treatment, or not. And with this knowledge, the computer can then predict which new cancer drugs could actually be the most successful, with about a 90% probability. But the problem is that the way it works is too complicated for a human mind, to understand why the computer is giving these predictions.

LB: So the scientist may know the algorithm, and some of the data sets, but not how the computer comes to its findings. How do the sculptures aid in this translating process?

MV: Exactly. There are actually hundreds of algorithms working together, so you can know every algorithm, but you don't know how, and why, the computer connected them together. The sculptures are construction sets that make tangible the relationship of nanoparticle molecules to the compatible cancer drugs based on their shapes. It helps the scientists I'm working with understand the computer's process in a much quicker fashion. This kind of visual, critical thinking process felt so similar to my own artistic practice when talking with my collaborators.

The differences between how shape is considered in both artistic and scientific fields. Having access to these aesthetic questions, at a nano-scale, has been fascinating.

LB: And it's really interesting how, in this case, the shapes become a way of unlocking a barrier to communication, between the computer and scientist.

MV: It can almost be compared to the beginning of psychology as a discipline. At the beginning there was a focus on behaviorism: so when you don't know anything about the brain, you just observe what a person or animal does, and then you can derive your conclusions from what you can actually see. But once the processes of the brain were being unlocked, and there major advancements in neuroscience, the brain wasn't a closed box anymore. It's similar to computer programs. Right now we have computer programs which build themselves, and we can't understand them, so we almost need to approach it them as behavioral psychologists would.

LB: Accessibility is such a predominant issue in your work, particularly the notion of visual or physical accessibility in a pragmatic way. It's something that spans your *Nano Construct* and *Well Plate Utopias* projects, as well as your ongoing work *Manuals for Public Space*. Could you talk about this project and the mechanism of sharing, learning, and revealing in your practice?

MV: That's true. So the *Manuals for Public Space* is a project which I started in 2011, with the idea to enable access to public spaces or create common spaces for communities in areas where they were rapidly being politicized, surveilled, or privatized. In the act of trying to produce or appropriate a commons on behalf of the communities I was working with, I found that I had to let go of control or authorship. Since I actually cannot produce anything in this scenario, I wanted to find a way to maximize open collaboration, to build a platform or collection of knowledge that could be mobilized. It was inspired by the way the internet works in a lot of ways, this priority on sharing knowledge as you reference, which runs through my work.

LB: Definitely, but what was interesting about this piece is that it was instrumental for the results to take place in physical space.

MV: Yes, the project is open source, which comes from the language of programming and the internet, but I was kind of curious if I could bring it into the material world, and if it could have an impact. To facilitate an open source architecture, in response to the ongoing privatization around the world.

LB: And I you're doing something similar in the lab, especially in bridging the gap between DIY science and the formal bio-medical community.

MV: For me, in a way, it comes down to a difference between quantitative and qualitative research. Also, the DIY approach to engineering scientific instruments already has tremendous impact on various different communities. Especially because of drastically lowering the cost of scientific equipment the DIY is increasing access to these things.

LB: The conceptual breadth of these projects brings up the interesting position of an artist working on projects with science or technology, where the tension between problem-solving and problem-posing is an ever present one.

MV: Yes, I really like to think about my projects as conceptual platforms that are aiming to solve some problems and during this process posing new ones which need again new solutions. It is the tension between these two, layered repetitively over and over again, how such platforms are built. These platforms in their various forms are producing knowledge either from this polarized tension or as platforms that facilitate exchange of commonalities and knowledge.