

Rocks in Vogue



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ABSTRACT

Landscapes have been exploited and polluted by humans in order to obtain metals. Materials are treated as commodities: extracted, used inside our devices and appliances, then discarded as useless matter. The timespan of efficiency is shortened more and more due to obsolescence, material desire and constant innovation. That's a paradoxical perspective compared to the deep time those metals embody, born in the outer space from star collision and arriving to Earth as meteors, 4 billion years ago.

Rocks in vogue is an exploration on the material flows within the electronic devices production and their disposal. Very often the connection between consumers and source is invisible and well-masked behind the slick surfaces of our laptops and smartphones. Through the disassembling of old broken devices, the metals found inside represent values, stories and resistance. This reverse process, from the end-product to the raw sources, opens the possibility of alternative forms of mining and a renewed attitude towards materiality, seen as agency with its own force.

The material's agency is expressed through low-power ceramic batteries; the elementary reaction moving from copper (positive) to iron (negative) represents a narrative of slow processes, material exhaustion and care. The batteries move from being something that supports our technological desires to statement objects that make things speak.

Keyterms: Design research, Material flows, Electronics, Energy, Battery, Care, Waste, Recycling, Craft, Critique, Landscape

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1. INTRODUCTION

A letter from my device to me

I'm part of you, so I can read your thoughts easily. You and I remember the first time you managed to buy the laptop you so deeply wanted. There I was, a brand-new MacBook Pro all for you. I represented status, functionality, aesthetic values; let's be honest, I'm a perfectly designed artefact. Me? I was ready to learn about my owner. There I was, naive and information empty. All the parts inside of me, from the hard drive to the smallest metal, started working. Have you ever looked at the wonderful complexity that I am? I'm better than a globe. I'm the holistic object par excellence. Each part of me comes from a different part in the world; I crossed the main oceans; I have been touched by countless fingertips and experienced all kinds of climate. I experienced the equatorial climate of Congo, the wet season in Bolivia, the temperate climate in Mongolia. Nevertheless, this is not important for you. Or let's say, you are not aware of this. Globalised markets, cheap labor, hyper-fragmented production. That is what you and I are intertwined in. Connected, even if you don't want to.

Then one day, the time to say goodbye arrived. I learned a lot from you, and you treated me well. There was a part inside of me that was not working anymore, and no, that was not your fault. I know how much you wanted to keep me with you, but I was dead for you. Inexistent, yet existent. A useless hulk. I'm constantly amazed on how things change, but don't disappear. I feel like I changed so many times in such a short life. So voraciously wanted in the beginning, then a tireless worker, and after that an unusable dead matter, hoping to dissolve in the air.

Inquiry

My inquiry is a critical exploration on what exists behind the surfaces of our devices. Even though we are aware to a certain extent that there are actual rocks and sands that make devices work, the process of extracting and making is hidden in the generic global factory. We only know that we want our devices to be thinner and the battery to last more and more. Considering mass production, the paradigm by which electronic devices are produced today, I argue that consumers often do not have any knowledge of the effort, time and process involved in making something.¹ So I asked myself many questions, including: how does the individual factory worker impact the making of a thing? And also, if we would know more about where our devices come from, including the social and environmental costs of them, would our material desires change? By placing myself as an intersection of a craftsman and a designer, I developed a series of batteries by crafting clay vessels and experimenting with the chemistry of two widely-used metals, iron and copper. I experienced the time it takes to interact with materials, the value of making and the wonder of making a slow and low-power energy container.

Note on the title

The title, *Rocks in Vogue*, aims to give a glimpse of the project. “In vogue” represent something that is ephemeral, trending, and connected to material desire: those elements represent consumerism itself. By preceding “in vogue” with “rocks”, the connection between the two is strident: how can rocks be in vogue?

With this title I want to pinpoint the paradoxical attribute of “ephemeral” to rocks, which are subjected to a deep time that is far beyond human understanding. Secondly, the title could potentially suggest a project related to precious stones, such as diamond, or metal such as gold. What the title is actually referring to is a different group of wanted metals, which are the ones embodied in our electronic devices.

1. Leslie Atzmon, Prasad Boradkar, *Encountering things. Design and theories of things* (Bloomsbury, 2017), pp. 96

2. BACKGROUND

Endless things

One of the key features of our time, in the Global North context, is the endless possibility of access to things and products. Everywhere we go, we encounter a company or a brand that tries to engage us, fascinate us with their products. Everything you could think of probably exists and you could buy it. For instance, e-commerce group Alibaba, with its millions of products of any type and category, represents not only a digital store, but a complex system that “is at once an Internet platform, chat system, financial institution, social network, cloud computing service, digital wallet, education and innovation driver, and an almost indescribably vast logistics network that links cities, ports and factory villages across the world”.² There are different reasons why we are surrounded by this huge amount of stuff - and that we feel the need to junk it to make space for new things. The number of new objects, the innovation, and the throw-away society saw its beginning around the 1930s, in a deep economic recession following the 1929 financial crisis. Bernard London’s pamphlet *Ending the Depression through Planned Obsolescence* is the first theoretical use of the concept as a cure to market saturation and economic recession.³

Planned obsolescence is a concept that describes a way of producing objects with an end date already inscribed in them during the design phase. This operation, perpetuated thanks to the consumeristic idea that people would buy new things when the old get broken, has had design as a valid ally for a long time.

Our everyday is complex. Every object we own, or rent, or simply use for a short amount of time has an untold story that starts from the very underground, a story that is almost impossible to tell and visualise. Sometimes we tend not to think about the behind the scenes of our everyday objects, and the industry foster this behaviour by making them impossible to disassemble, repair, or simply understand how they are made. In the 1950s, long before the Internet of Things revolution, smartphones, and laptops, an economist called Leonard E. Read drafted a short novel about the supply and production chain of a simple pencil.⁴ The pencil is considered a basic object, made of less than 10 materials, nevertheless its story is incredibly complex and involves an endless amount of people and know-hows. If we project this assumption to a laptop for instance, this complexity becomes overwhelming.

2. Geo-Design exhibition platform, Design Academy Eindhoven <https://geodesign.online>

3. Bernard London, *Ending the Depression through Planned Obsolescence* (1932), https://upload.wikimedia.org/wikipedia/commons/2/27/London_%281932%29_Ending_the_depression_through_planned_obsolescence.pdf

4. Leonard E. Read, *I, Pencil* <https://fee.org/articles/i-pencil/>

The complexity behind products can be simplified through a tool called *Life Cycle Assessment*.⁵ This methodology began to be known during the 1970s with many studies and publications, most of them focused on energy requirements and what should society do to avoid issues.⁶ *Life Cycle Assessment* defines the environmental impacts associated with all the stages of a commercial product life, from the extraction of raw materials (cradle), through the production, manufacture, distribution and use, to the final stages of recycling or disposal. Simplifying the complexity, though, could exclude certain facts in favour of others. For instance, the LCA of an Apple MacBook Pro does not mention the displacement of communities in certain parts of the world, in order to obtain minerals from the ground.⁷

The institution TCO Certified provides the world's most comprehensive certification regarding the sustainability of IT products.⁸ Their criteria include a socially responsible sourcing and manufacturing, such as "Responsible mineral sourcing, including conflict minerals and cobalt".⁹ So, devices and appliances that we own contain many different metals and silicates that are being extracted in many parts of the world. I focused on metal extraction during my exploration, and in the next sections I will briefly describe how extractive modes are one of the pillars of the capitalistic economic system, and how this system is generating an enormous quantity of waste.

5. Silvia Barbero, *Il fare ecologico. Il prodotto industriale e i suoi requisiti ambientali* (Edizione Ambiente, 2012), pp. 25-26

6. SEMTRIO, History of Life Cycle Assessment (LCA), <https://www.semtrio.com/en/history-of-life-cycle-assessment>

7. SOMO, *Human rights violations by Chinese mining companies in the Democratic Republic of Congo*, Lubumbashi 2018

8. <https://tcocertified.com/about-tco-development/>

9. <https://tcocertified.com/criteria-overview/>

Extraction / Extractivism

Since the Neolithic, digging into the earth for materials became more commonplace, creating trajectories of human-thing interdependencies.¹⁰ From those early beginnings, minerals start to circulate and move between humans, defining not just their physical role in the world but also their own roles in socio-economical interactions. According to the authors of *Anthropology of Precious Minerals*, materials' value is not exclusively economic, but constantly gauged within multiple and interconnected figures/assemblages.

Within human-mineral interdependence, extraction stands for a conscious action of, according to the *Oxford English Dictionary*, “**process of drawing (something) out of a receptacle; the pulling or taking out (of anything) by mechanical means**”.

Recently, emerging from Latin American scholarship, a contemporary, political term is juxtaposing the neutral term extraction: **“Extractivism is a mode of accumulation that started to be established on a massive scale five hundred years ago. The world economy – the capitalist system – began to be structured with the conquest and colonisation of the Americas, Africa and Asia”**.¹¹

New cavities and mining projects are carried on continuously, considering that every innovative technology requires minerals and metals to work. Humans' greed for minerals has grown to such an extent that by 2080, there will be more minerals in our appliances, industries, products rather than underground.¹²

10. Elizabeth Ferry, Annabel Vallard, and Andrew Walsh, *The Anthropology of Precious Minerals* (University of Toronto Press, 2019)

11. Alberto Acosta, *Extractivism and Neoextractivism: Two sides of the same curse*, p.62, Research Gate

12. Formafantasma, *Ore Streams* (2017-2019) <http://www.orestreams.com>

E-waste streams

Electronic devices are the fastest-growing waste group. A UN report from 2019 outlines the current state of things regarding recycling practices and future trends: only 20% of e-waste is correctly recycled, with 80% of products ending up in landfills or being illegally exported to other countries as second-hand.¹³ E-waste in landfills, or informally recycled in developing countries, represents a huge risk for people's health and for soil and water contamination. Agbogbloshie, not too far from the capital Accra (Ghana), is at this moment the world's largest e-waste dump. This place is the arena of young men and women smashing old devices and burning cables trying to extract precious metals. Injuries, lungs and back problems, untreated wounds are common conditions and direct consequences of never-ending consumerism and lack of interest in the issue. The report tackles opportunities, highlighting how "as much as 7% of the world's gold may currently be contained in e-waste, with 100 times more gold in a tonne of e-waste than in a tonne of gold ore".¹⁴ This statement resounds the philosophy of certain recycling companies such as the Swedish Ragn-Sells, which are making concepts such as circular economy the base of their projects.¹⁵ What people are asking to policy makers is to have the right to repair, re-use and recycle.

I claim that focusing only on correct recycling practices is not enough: we need to buy less, repair more and take better care of our devices. It is a rebellious behaviour towards a market that is still pursuing planned obsolescence within design and production phases. Many organisations, such as *HOP. Stop Planned Obsolescence*, are investigating companies and raising awareness towards consumers.

This French organisation includes a wide expert committee that supports different campaigns with their knowledge on the subjects of recycling, environment and sustainable development.



Fig.1 - E-waste in recycling centre in Kista, Stockholm.

13. UN Environment Program, UN report: Time to seize opportunity, tackle challenge of e-waste (24th January 2019), <https://www.unep.org/news-and-stories/press-release/un-report-time-seize-opportunity-tackle-challenge-e-waste>

14. UN report: *Time to seize opportunity, tackle challenge of e-waste*. (UN Environment Program, 24 January 2019)

15. <https://www.ragnsells.se/det-vi-gor/cirkular-ekonomi/>

Vitality of matter and thing-power

“Why advocate the vitality of matter? Because my hunch is that the image of dead or thoroughly instrumentalized matter feeds human hubris and our earth-destroying fantasies of conquest and consumption. It does so by preventing us from detecting (seeing, hearing, smelling, tasting, feeling) a fuller range of the nonhuman powers circulating around and within human bodies”.¹⁶

Political theorist Jane Bennett’s thesis is a form of vitalism that recognise non-organic material to have agency of their own. She argues that storms, metals and plastic are not just a dull matter that are controlled and shaped by humans, but that they have their own tendencies and trajectories. Taking it seriously, the idea of vibrant matter means to recognise that things cannot just be thrown away, because they will continue existing as a discarded commodity. The way we are disconnected to the before and afterlife of objects that surround us has as a consequence a careless attitude towards them. Thinking within this theoretical framework, I remember with a nostalgic note the ability of children to see the world as alive, vibrant and animistic. I have a strong connection to the mineral world and I can be enchanted by the forces of rocks and mountains, which to me are nature in their pristine form. But thinking that my devices - and myself - are actually made of rocks was something that I never truly thought about.

As a way to engage with the materials inside my device, I synchronised my work pattern according to the exhaustion of my device. I did this exercise for a week. When my laptop was out of charge, I stopped working and while it was recharging I did some yoga and meditation. I started to think about the Lithium, Cobalt and Nickel inside my battery as vibrant matter that were working together to store electricity as fast as possible. That drove inside me a sense of guilt and I felt the urge to write something to them, so I started writing letters and short notes.

Jane Bennett’s concept of thing-power, as well as Bruno Latour’s actant, have been the guiding concepts through my project and helped me develop methodologies as well.

16. Jane Bennett, *Vibrant Matter. A political ecology of things*, (Duke University Press, 2010) pp. ix

3. PROCESS

The loop I sometimes feel trapped in is this realisation that I/we are part of a system that plans obsolescence, seeks for perpetual innovation, and has an insatiable material desire. Since I began questioning these things, I started my inquiry from two objects of my everyday: my laptop MacBook Pro and my iPhone 6s. Unfolding the supply chain of the whole object is extremely challenging, considering the number of components and metals travelling across oceans; from Lithium-ponds in the Salar de Atacama in Chile to the illegal Cobalt mining in Congo. The Apple narrative of **cloud, air, light**, as well as the design, are perfect elements to distract people about the truthful narrative of extraction, shipping, refinery, production.

Dematerialisation as a method

Design can be a tool to discuss society, behaviours, technology and design itself. Discursive design understands the practice “as a way to investigate, find unfamiliar problems, and provoke audience’s minds”.¹⁷ In this project, I define the approached objects as **infrastructures** or **media**. Author John Durham Peters describes media as “ensembles of natural element and human craft”, meaning that both material and immaterial things must be considered as a “meditation on the human condition, which also means a meditation on the nonhuman condition”.¹⁸ Therefore, seeing things not just at the surface of their appearance, but also inside them, before and after them, allows us to tell a story about the human’s world-shaping.

The method I have been adopting is a dematerialisation of the investigated objects (Fig.2). The action of opening up something that is supposed to be closed, atomised, allowed me to discover things. Beyond the surface, I found many different metals, with different colours, all of them stuck in plastic boards and circuits. I describe these materials as the artists Revital Cohen and Tuur Van Balen do in their project *b/NdAlTaAu*¹⁹, as *techno-ruins*: the meaning is that the extractive processes are not coming from a natural mineral reserve, but from an artificial and technological one. From those *techno-ruins*, I tried to extract, with basic tools, the metals to their primitive status (Fig.3).



Fig. 2 - Disassembling of a MacBook Pro, still from a video.

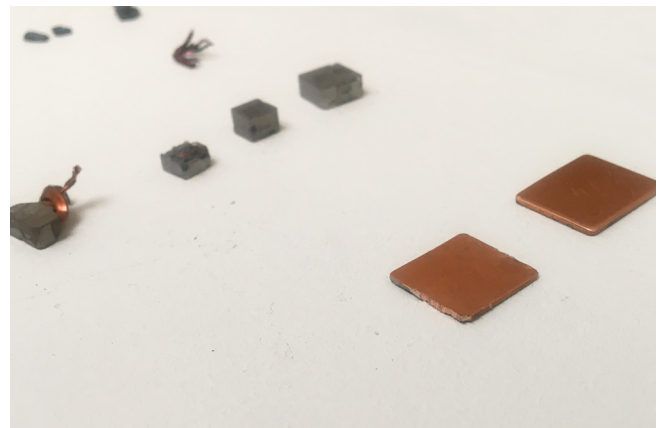


Fig. 3 - Materials extracted: copper and capacitors.

17. Stephanie M. Tharp, Bruce M. Tharp, *Discursive Design: Critical, Speculative, and Alternative Things* (MIT Press, 2019)

18. John Durham Peters, *The Marvellous Clouds* (The University of Chicago Press, 2015) pp. 3

19. Revital Cohen und Tuur Van Balen – *b/NdAlTaAu*, 2015 <https://www.cohenvanbalen.com/work/bndaltaau>

Reflecting on the extractive actions, aspects of labor, time and energy occurred to me. Firstly, the object was opposing resistance, so the process was long and difficult from time to time. The little amount recovered through this artisanal method probably was not enough to re-use for something else, but it still had an intrinsic value. As an attempt to close a cycle, I melted some of the metals I recovered, bringing them back to their raw status (Figs. 4-6). This first explorations with metal and disassembling computer parts made me realise how little I knew about the actual physicality of my devices, something that are usually seen as atomised. In the following part of my process I reached out to people in discussions and workshops and I moved towards the proper exploration of my degree work - the batteries.



Fig. 4 ,5,6 - Melted metals (aluminum, copper, tin).

Survey and interviews

In the first stage of the project, I conducted a quick survey regarding people's behaviours towards their devices. The answers collected were 34. The questions ranged from the amount of electronic devices owned, to the actions taken when a device break. From the results, one insight was that when a device is broken, the tendency is to store it at home and buy a new one. Every person reported to have at least 3 broken devices stored somewhere in their home. At the question *How would you rate your consumer behaviour regarding purchases, repair and disposal of electronic devices?*, the average is 6/10, and at the question *Would you say that you feel affection for your devices?*, 54% of respondents replied yes.

Surveys are a quantitative research tool, focused on numbers and simplification of people's thoughts and behaviours, but it gave me a broader and more inclusive perspective.²⁰ Within this project I found it really important to work independently and develop an artistic approach and proposal that was based on my intuitions and research. Nonetheless, it has been really helpful reaching out to people, in order to start discussions about a topic that I care and I think it is important to talk about. I have been in contact with different recycling companies operating in Sweden, conducting informal interviews. One of them was the Swedish company Ragn-Sells, which is involved in recycling and circular economy projects.

I met Graham Aid, Group Innovation Coordinator and Strategist at Ragn-Sells, and we talked about how Swedish companies are approaching electronic waste. Nowadays, the main metals that are recovered from e-waste are gold and copper. Those two are only a small percentage of the total number of metals contained in, for instance, a smartphone, which has more than 40 different metals inside.²¹ Sweden stands out among the European average for e-waste recycling, which is around 30%, with a 48% of electronics correctly recycled.²² Despite the Basel Convention forbidding European countries to export e-waste to other countries, a large amount reaches developing countries (such as Ghana) labeled as second-hand products. Many of those second-hand products are already broken or too obsolete to work more than a couple of months.

It is clear how important it should be to dispose electronic waste correctly, but as mentioned in the previous chapter, a more responsible consumer behaviour in purchasing and caring for the object is also crucial.

20. Survey <https://8cxge63ahzt.typeform.com/report/kp8l44wT/G6N6atoP5YvZwnNW>

21. Brian Merchant, *The One Device: The Secret History of the iPhone* (Little, Brown and Company, 2017)

22. <https://www.europarl.europa.eu/news/en/headlines/society/20201208STO93325/e-waste-in-the-eu-facts-and-figures-infographic>

Materials and iterations

In the following chapter, I describe my process and how it developed from the inquiry and the first material explorations, including the issues I felt important to bring to the surface. The process reflected on the following question: **How can a designed artefact tell a different narrative from the current one that is embodied in the electronic devices' branding?**

Through a particular focus on clay and recycled metals, those two materialities work together in my design proposal, as further explained in the next parts.

Craftivism

Reviewing the dematerialisation process on the MacBook Pro, I mapped out through brainstorming and writing the concepts and insights brought to the surface: time, labor, energy. But also the traces of all the hands that interacted with it, casting a human and fragile light to the object (Figs. 7-8).

Then I approached clay, a material that responds to the high-tech aesthetics in a strident way. Clay is fragile and requires attentiveness, care and an emotional feel to it. It is a material deeply bounded to the place where it comes from: this can be understood from the different properties it has depending on the place of origin. During the past 20 years, a tendency towards craftsmanship has been described as Craftivism, which is the vision of craft as a sphere of political action, debate and critique of Capitalism.²³ Beyond the mere critique, “it is time to ask how the craft and design fields account for their participation in overwhelming material excess and destructive extractivism”.²⁴



Fig. 7 - Traces of worker's labor inside of a MacBook Pro.

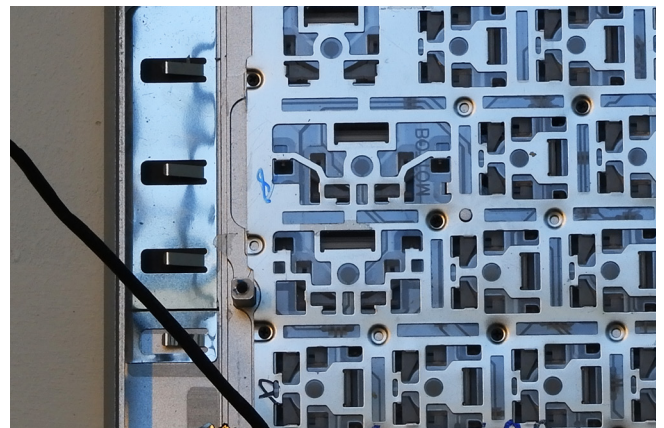


Fig. 8 - Signs of a blue marker in the keyboard frame.

23. Edited by Betsy Greer, *The act of Craft and Activism: Craftivism*, (Arsenal Pulp Press Vancouver, 2014) pp.69

24. Edited by Anthea Black, and Nicole Burisch, *The New Politics of the Handmade: Craft, Art and Design*, (Bloomsbury Publishing USA, 2020)

Explorations on batteries

Exploring the material, I gained an understanding on how clay is vibrant and alive. Thinking about my relationship with energy and devices, I thought how much I take for granted the act of recharging the battery of my device, without thinking too much about it. Lithium-ion batteries are considered to be the key products for the so-called green revolution. The mineral, mainly extracted from the brine below deserts in Chile, Bolivia and Argentina, makes the batteries light, rechargeable and long-lasting. Those deserts are called Salar, and well known is the Salar the Atacama, the biggest one in Chile. To me, energy is given and easily accessible - but behind a Lithium battery there is a supply chain that exploits lands and pollutes water, impoverishing the indigenous communities living in the Salar.²⁵

While visiting a recycling centre in Kista, north of Stockholm, I collected scrap pieces of copper and iron (Figs. 9-10), and in that context I thought it would be interesting to give a new purpose to those materials considered waste and craft a battery that would require my care and attentiveness.



Fig. 9,10 - Recycled metals collected in a recycled centre in Kista, Stockholm.

25. Studio 1, The Lithium Triangle (Royal College of Art, MA Environmental Architecture, 2018/19), <https://www.rca.ac.uk/study/schools/school-of-architecture/environmental-architecture/studio-descriptors-201819/studio-1-lithium-triangle/>

Doing research on low-tech batteries, I came across an artefact called Baghdad battery (Fig.11). This object has been found in an area in Iraq close to the capital and consists of a 10 cm clay jar containing a copper cylinder that encased an iron rod. Many people tried to understand the purpose of this object, which looks indisputably like a basic battery. An interesting interpretation is that it was used for a religious purpose, in order to connect people with divinities through a mild electric shock.²⁶ Taking the Baghdad battery as a reference and inspiration, the first experiment has been done with a glass jar filled with different acidic solution, one was vinegar and the other one lime juice (Fig. 12).

The battery works by a reaction that moves ions from the positive metal, in this case copper, to the negative metal, iron. Both metals are immersed in an acidic liquid that allows the reaction to happen, obtaining electricity. The voltage of the battery was quite low (<0.5 V) and the metals actually suffered a corrosion process. In order to obtain a higher voltage, I tried out a system of lemon batteries connected to each other. Time became an important aspect during my experimentation. Working with perishable materials such as lemon and vinegar allowed the battery a short lifespan - from a subjective and human perspective. Also a force, in the form of a chemical reaction, deteriorate the metals: the negative (iron) got a layer of copper and at that stage the reaction was over.

I did an estimation on how many hours it will take to charge an iPhone 7, and it will take around 140 hours. This testify how much are we constantly asking for from our devices, without even thinking about it.

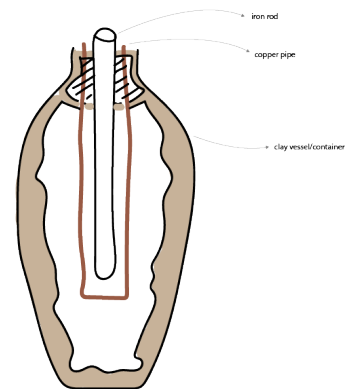


Fig. 11 - Components of the original Baghdad battery.

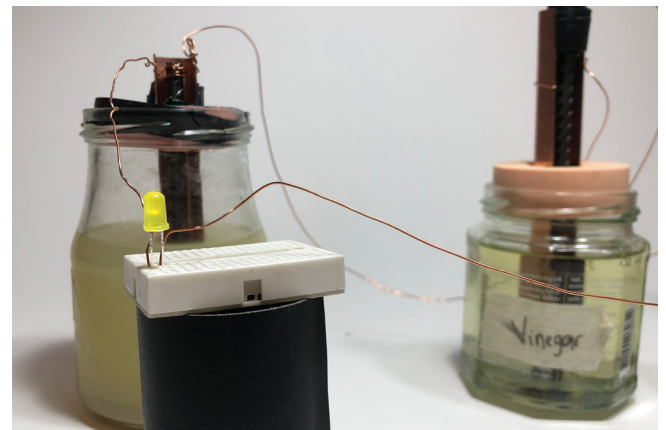


Fig. 12 - First experiment of a batteries cluster inspired from the original battery.

26. <http://news.bbc.co.uk/2/hi/science/nature/2804257.stm>

Design process

The form-giving process followed two different directions. The first was an exploration of the object vessel and container to create a battery. The clay piece should hold and carry the liquid inside, essential element for the chemical reaction. I started by crafting simple clay vases using the wheel throwing technique, and got familiar with the material. However, I wanted to work against the slick and symmetric high-tech aesthetics, in order to communicate the vibrant and dynamic properties of the material and of the concept energy. I conducted a workshop with 4 participants (bachelor and master students) where the task was to reflect on a shape that communicate the concept of energy. Through clay, the participants interpreted energy in different ways: someone worked towards presence of energy, others towards absence/depletion of energy. Everyone moved away from the rectangular or cylindrical shape of the battery as we know it, pressing their own perception into the material (Fig. 13,14).



Fig. 13, 14 - Some results from the workshop.

Based on the workshop, the exploration moved towards more and more amorphous shapes, looking almost fragile and unstable in their balance. Through my shapes, I wanted to reveal what is usually hidden in electronic devices; using the metallic grid of a keyboard I pressed on the surfaces, creating a texture. I worked against the slickness of the devices' surfaces and the invisible forms of labor within their production. By pressing my thumbs and hands to the surfaces, and by inviting other people to do so, the manual labor is part of the object aesthetics and act as a statement (Fig.16).

After doing explorations on the plastilina clay we have in school, I moved towards the actual final material. Since the ceramic pieces should not be fired in order to optimise the battery performances, I chose to work with a black clay to get a rough finish to the pieces.

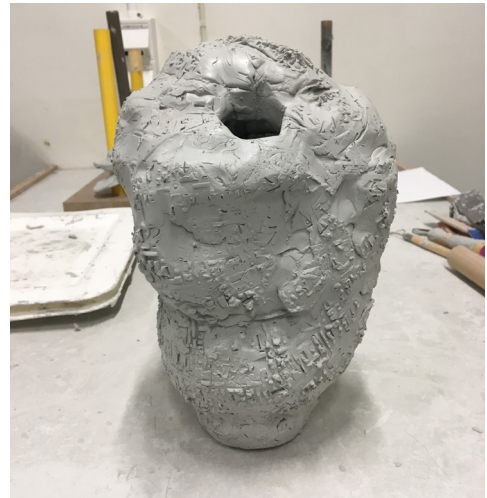


Fig. 15, 16 - Iterations of the workshop results.



Fig. 17, 18 - The first pieces crafted from stoneware, unfired.

4. DESIGN PROPOSAL

The batteries

The parallel exploration of the batteries and the vessel shapes got unified in the final proposal. The system is composed of 3-4 batteries connected with each other, each one of them containing a copper piece and an iron rod in an acidic solution (fig.). The ceramic pieces are connected together through a copper wire, so the batteries work together to generate enough energy to power a LED bulb. The poetics of the reaction is expressed through a care attitude that the batteries feel for each others: I noticed that if one of the batteries is not powerful enough, the others intervene by recharging the weaker one. By being a recurrent concept in my project, the aspect of time is crucial: the reaction, from positive metal (copper) to the negative (iron) is slow and lasts more or less for 2 weeks.

The forms moved to a rock-alike shape and texture because I wanted to emphasise the origin and the rawness of the metal sources (Fig.19-21). Besides, I wanted to give an ambiguous affordance to the pieces: **is it a vessel, or a rock?** Through this system, that will be part of the exhibition, I materialise my process and the understanding of materialities.

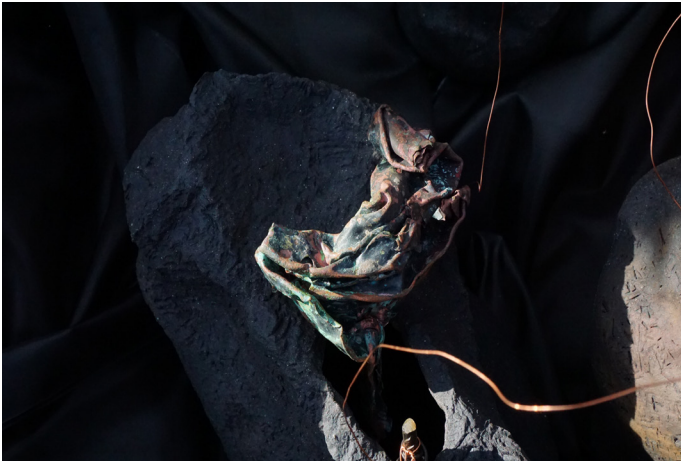


Fig. 19, 21 - Batteries cluster, fired.

Film and Storytelling

Part of the theoretical background of this project is the so-called material turn, where the primary question in these conversation is whether non-human entities have the power and means to cause change in the world.²⁷ Through the film, I tried to give space to materials and make them speak. I worked with 3D representations of electronic devices and rocks, placing them together in the scene. The narration is from the material perspective, and it represents a message from the materials, to humans.²⁸



Fig. 22 - Still image from the short film.

27. Edited by Leslie Atzmon, Prasad Boradkar, *Encountering Things. Design and theories of Things* (Bloomsbury, 2017) pp. 193

28. Film on Vimeo <https://vimeo.com/555161830>

*We encountered planet earth by chance,
through a meteor shower,
about 4 billion years ago.*

*We can only begin to imagine
the sense of wonder
humans must have felt
understanding our properties.*

*Nevertheless, the movement of people,
materials and land
increased enormously:
from what was pulled out from the
ground,
very little was being restored.*

*This is an invitation
to care for,
think with,
and feel through us.*

5. CONCLUSION

In this project I have attempted to highlight the human consumption of electronic devices, and the unawareness that we have regarding the amount of processes and energy required to make things work. Through explicit critiques towards the hyper-fragmented production and extractivism, this journey has been at first an evaluation of my own ways to relate with devices. The hand-crafted ceramic batteries were inspired by a mysterious ancient technical object, but contextualised besides the black, boxy and undiscoverable Lithium batteries. The striking difference between the two forms and meanings hopefully will spark debates and reflections, defining the project as a materialised discussion piece about my research and insights.

6. APPENDIX

I intend to use this section of my written report as a summary of the feedbacks and reflection I have gotten from the final presentation on the 24th of May and during the Spring Exhibition at Konstfack. I will organise this text in two points, which represented the main areas of discussion.

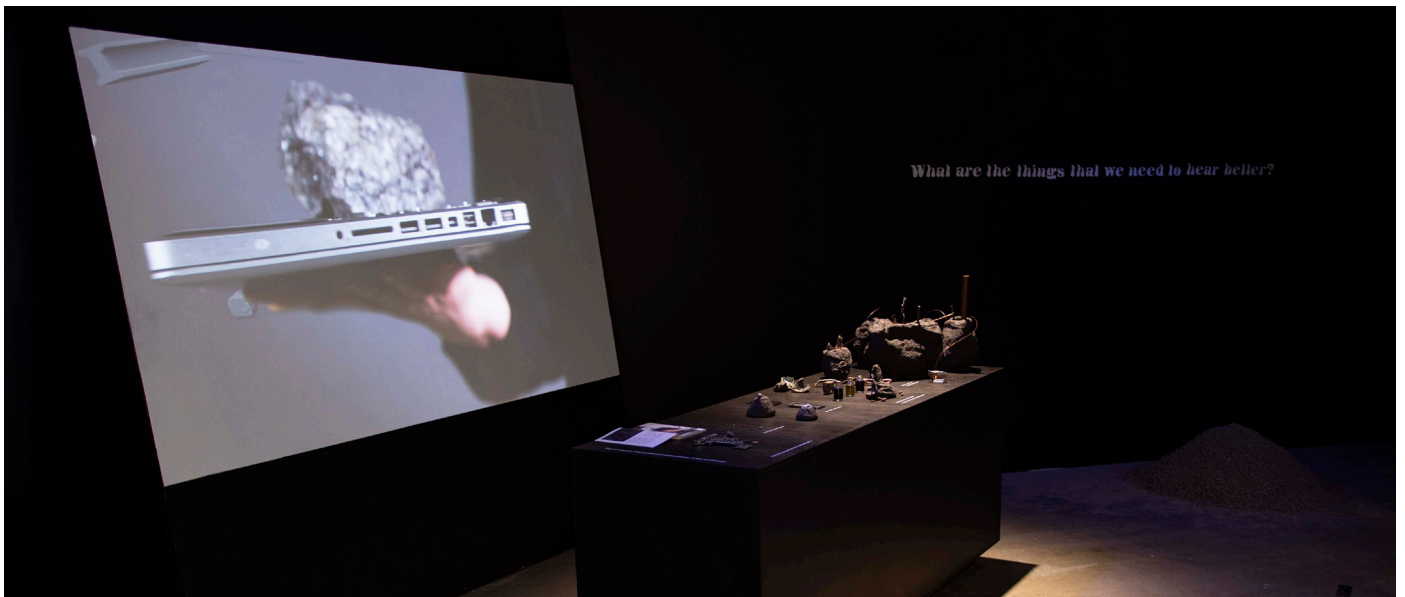


Fig.23 - Exhibition at Konstfack, Room S4.

1) The narrative of clay and meaning of the materiality

During the Spring Exhibition at Konstfack, I used the exhibition space as a moment of research. By working with colours, lighting and visual media I tried to create an immersive space where reflections on extraction, material uses, and consumerism were encouraged (Fig.23). I had many interactions with different people and interesting discussions occurred, especially on how detached we are from the processes that make an object. Even though in the exhibition space the topic of e-waste was only touched upon, that was one of the key points raised from the audience. That made me realise that the topic is actually perceived as a problem, even though not broadly in the common knowledge. I reflected daily on the feedbacks received, in order to adjust and tweak the narrative accordingly. For instance I realised that the materiality of clay could have been communicated differently, by merging more smoothly the first explorations on devices to the final batteries. Already during the 75% presentation in April, my guest critic Beatrice Brovia and I discussed about the importance of landscape and place in relation to clay, so the idea of harvesting and processing my own clay for the batteries is something that I will bring with me in the future development of the project.

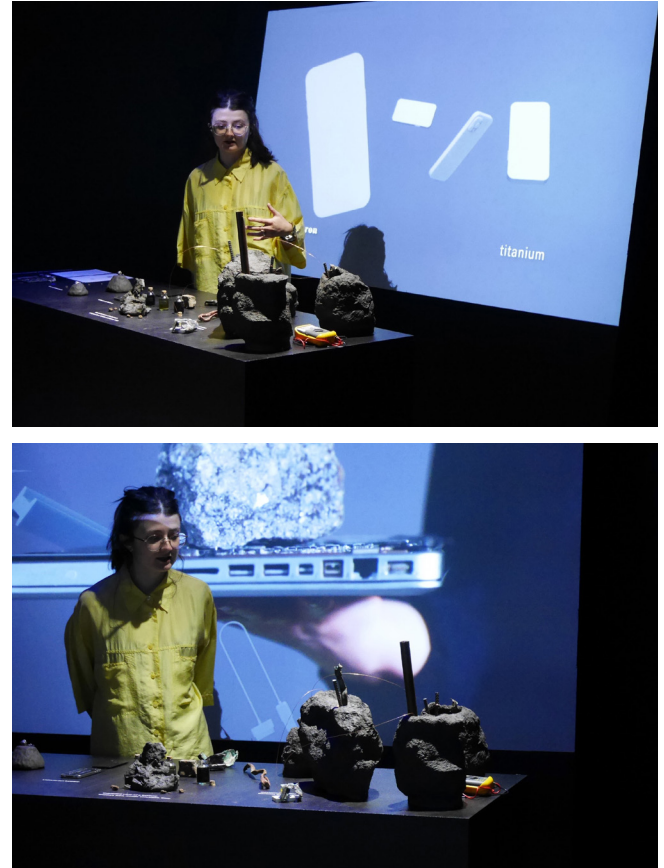


Fig. 24, 25 - Exhibition space, 100% presentation.

In addition, some discussions arose around the opacity of the clay, by hiding or not revealing the inside materials, copper, iron, and liquids (Fig.4). The opacity of the clay, together with the large opening of the vessels served the purpose by acting as counterweights and tackle the curiosity. In order to show the inside process I placed an exploded view of a battery besides the final batteries. The three different liquid used (vinegar, lime and lemon juice) were placed in open test tubes so the acidic smell was present.

Many people who have previously seen the project on the website said they were touched by one of the picture, where one of the battery is held by a person (Fig.6). From that I realised how different my project could have been communicated if I would have investigated more the relation human-battery, perhaps through filming.



Fig. 26 - Detail.



Fig. 27 - LED light lit by the batteries.



Fig. 28 - Battery held by a person.

2) What is the identity of the project - artistic or educational?

I am inspired by few design studios that incorporate design research in their practice. One example is definitely Formafantasma with their project Cambio, which investigates the governance of the timber industry.²⁹ Their use of different medias, such as material explorations, film, and online catalogues allow the project Cambio to exist beyond the exhibition context. At the same time, the exhibition context is actually seen as a moment of reflection and discussion between the audience and the artists. By collaborating with different figures and adopting a very interdisciplinary approach, Formafantasma's projects reach a broad audience.

This master for me was truly a journey to understand my role as a designer and what my contribute to the field is. Through my degree project I found it interesting to merge different fields such as design and craft, and be a designer who is almost "undesigning" - by collecting, disassembling, and somehow working against one of the most mass-produced items. I see this project as an ongoing investigation that I aim to develop further in different ways: on exhibition contexts, through possible grants and collaborations with others, possibly through a small local production, and through workshops. Regarding the last one, I have been in contact with the Mentorspace in Kista, where the possibilities of guiding workshops regarding energy, material use and low-power are concrete. I see this as the educational placement of my project.

29. Formafantasma, Cambio, website: <https://formafantasma.com/work/cambio>

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