Tension between Human and Nature in sculpture.

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Abstract
This article explores the intricate relationship between sculpture and tension within the context of the human-nature dynamic. Through an examination of sculptural works such as “{Terra, Eu}”, “{Mão, vida}” and “The First Gesture,” we uncover the profound role tension plays in infusing artworks with dynamic energy, transforming passive viewers into active participants. Our exploration extends the horizons of sculptural practice by incorporating techniques like 3D modelling mixed with metalworking, and stone carving. Our research attempts to show a possible revaluation of conventional notions of reality and representation in response to the ever-evolving dynamics of our present. While acknowledging the limitations faced, including time constraints and the vastness of sculptural possibilities, we underscore the uncharted territories of emotional interactions within art and the exploration of art in virtual realms. In conclusion, this research serves as a point of departure for the ongoing investigation of the intersection between art and science, with a focus on deepening our understanding of our place within the natural order and the pursuit of balance and harmony in our interactions with the environment and sculpture.
Key words: Movement; Balance; Force; Installation; nature-culture, contemporary art.

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Calouste Gulbenkian Foundation Fellow and Merit Scholarship from the Faculty of Fine Arts of the University of Lisbon. Has participated in several exhibitions and projects, both collaborative and individual, including several artistic residencies passing through Portugal and Greece.
Currently works with sculpture in multiple experimental and traditional materials, including stone, cement, metal, wood plastic and plaster. With a mutual interest in photography since his childhood, he focused mainly on sculptural photography of space and objects. The discovery of sculpture led him to explore the world and the space that surrounds him in a more interactive way and through modules, something common to much of his sculpture as to expand the idea of adaptability to the place.

1. Introduction

Tension is inherent to life.

The fundamental question we aim to address is: "How can the tension between humanity and nature find expression within the medium of sculpture?" As we embark on this exploration, we are drawn to the tangible nature of sculpture, a characteristic that has piqued our interest.

One of the hypotheses that arises centres on human interaction, not only with one another but with the broader world, mediated through physical means. This physical interaction forms a critical aspect of human existence. The intriguing link between this fundamental aspect of human interaction and sculpture is readily apparent. Throughout history, sculpture has often transcended its symbolic or

conceptual intentions to emphasize the tangible object itself. It is in this duality, where the physicality of sculpture meets its symbolism, that we perceive a potential bridge connecting the realm of human-nature tension.

Consequently, we delve into the question: "What does it signify to experience tension concerning nature, and how does this tension reverberate within our human context?" To gain insight, our journey commences with an examination of how tension has been harnessed in sculpture across different periods. Subsequently, we embark on a series of artistic experiments, exploring both physical and post-physical manifestations of tension.

Throughout these investigations, a guiding perception underlines our approach – the belief that our human perspective is not isolated but inherently linked with the natural world. This perspective recognizes the ongoing blurring of lines between what we deem artificial and natural. Tension emerges as a recurring motif in the artistic canon, characterized either through direct and focused representations, such as "The Discobolus" by Myron from two centuries b.c., "Hercules the Archer" (1909) by Antoine-Emile Bourdelle, "Bornibus" (1985-1987) by Mark di Suvero, and "Milk stone" (1978) by Wolfgang Laib, or through its contrasting state of maximum relaxation. In each sculptural work, equilibrium is a pivotal consideration.

Our exploration eventually leads us to contemplate the essence of balance and its connection to our present inquiry. We discern that, at its core, tension represents an ephemeral equilibrium, poised at the precipice of force, moments away from either a physical or perceived breaking point, ultimately returning to a state of relaxation.

This scientific exploration delves into the relationship between humans and nature, as expressed through sculpture. It bridges the gap between art and science, unearthing the nuanced ways in which tension serves as a conduit for understanding the profound interplay between humanity and the natural world.

2. Materials and Methods

2.1. Sculpture Development

The process of developing sculptures encompassed a combination of manual and electrical tools, as well as the use of 3D modelling software, specifically SketchUp and Blender. This diverse approach allowed for the creation of sculptures in various mediums, contributing to the research.

2.2. Methodological Approaches

To achieve comprehensive results, multiple methodological approaches were employed throughout the research:

a. Intuitive Method: This approach involved a conversational interaction with the materials, exploring different possibilities and techniques to elicit tension responses within sculptural works.

b. Atelier Method: In conjunction with the intuitive method, practical studies played a significant role in the research process. The atelier method facilitated hands-on experimentation and observation.

c. Cartographic Method: The cartographic method focused on the study of how the work process integrated into the final sculptural pieces within specific exhibition environments. This method allowed for a deeper understanding of the contextual aspects of tension in sculpture.

2.3. Sculptural Works

Building upon previous smaller studies that investigated the broader relationship between tension and sculpture, three final sculptural works were crafted. These works reached their ultimate forms through the use of metal and marble as primary materials, reflecting the culmination of the research findings.

“{Terra, Eu}” {Earth, I} -2022

The object consists of five main elements:
1. Stainless Steel Cables: Three strands of 2 mm stainless steel cable, with varying lengths depending on the installation room.
2. Pulley Systems: Three pulley systems, each comprising a round wall mounting hook, a carabiner, and a round-end steel rolling wheel pulley.
3. Marble Cylinder: A cylinder measuring 110 mm in diameter and 130 mm in height.
4. Metal Handles: Two handles made of 8 mm round carbon steel and a 20 mm hollow round with a blackened patina achieved through burnt oil.
5. Ankle Strap: A black ankle 40mm strap fabricated from nylon fabric with a metal clasp.

The marble cylinder:
To reach the final marble part of the object the following steps were used:
Shaping: The marble was turned on a lathe to achieve a round cylinder shape with parallel sides as intended.
-On the top surface: A concave point, 15 mm in depth relative to the surface, was created on the top of the cylinder using a mini angle grinder (125 mm). The surface was then polished using an electric polisher with a sanding adaptor, progressing from P36 to P1500 sandpaper.
-On the bottom surface: A 40 mm and a 50 mm diameter circle from the centre was marked. The 40 mm circle to be excavated using stone drill ends going from 2.5 mm to 15 mm and finishing the details of the 60 mm deep hole using a straight grinder with a 40mm diamond plated cutting milling wheel, a 15 mm spherical diamond plated carving milling end as well as a conical 15 mm diamond plated carving milling end. After these it was used a Portuguese mallet and a 4 mm chisel to create a 2 mm deep 50 mm diameter radial indent around the 40 mm hole by hand.
- On the round surface: Three equidistant points around the cylinder were drawn level with the concave part and drilled at an angle to reach the walls of the inner hole, each with a diameter of 3 mm.
-The bottom cover: A 50 mm diameter cover with a 2 mm depth was employed on the bottom side to facilitate the attachment of steel cables.

Fig 1. ”{Terra, Eu}” – Cylinder. Ricardo Imperial

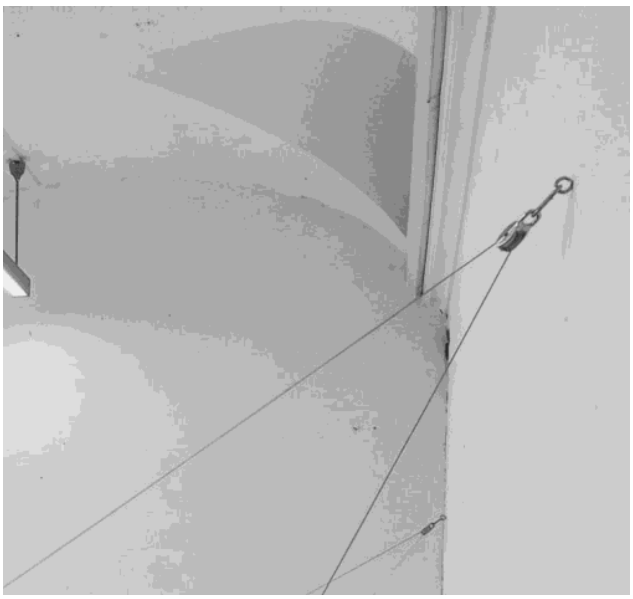

Fig 2. ”{Terra, Eu}” - Pulley System. Ricardo Imperial

The handles:
Materials Used: Mini angle grinder (125 mm), drill, MIG welding machine, electrode welding machine, straight grinder with a metal carving milling end, metal drilling ends ranging from 3 mm to 18 mm, blow torch for the blackened patina, round metal mallet, metal cutting disks (125 mm), metal grinding disks (125 mm), metal sanding disks (P60, 125 mm), anvil, straight pliers, cutting pliers, electric sander, metal sandpaper ranging from P60 to P240.

Fig 3. "{Terra, Eu}" – Handle. Ricardo Imperial

The ankle strap:
Made of nylon fabric strap, a metal clasp with Velcro. It required a cutting knife as well as a mini angle grinder (125m) a belt sander, a drill press, a 3mm metal cutting drill bit.

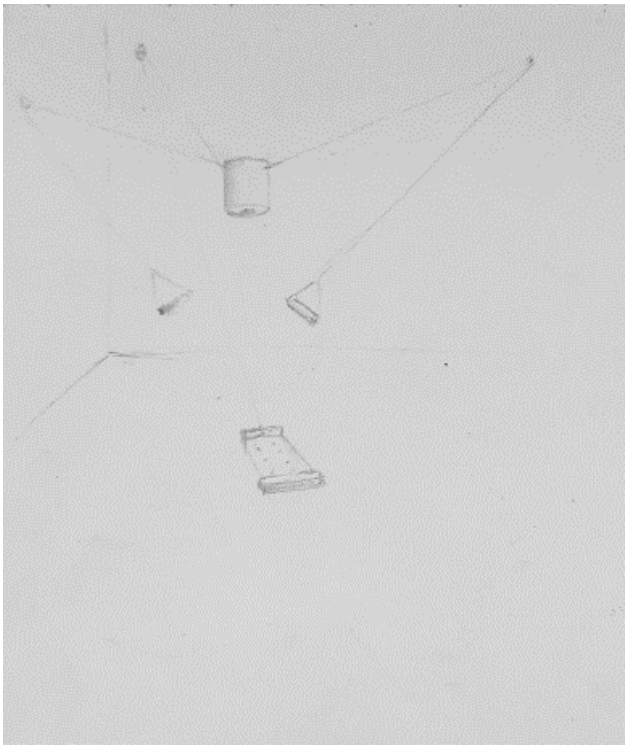

Fig 4. "{Terra, Eu}" Drawings. Ricardo Imperial

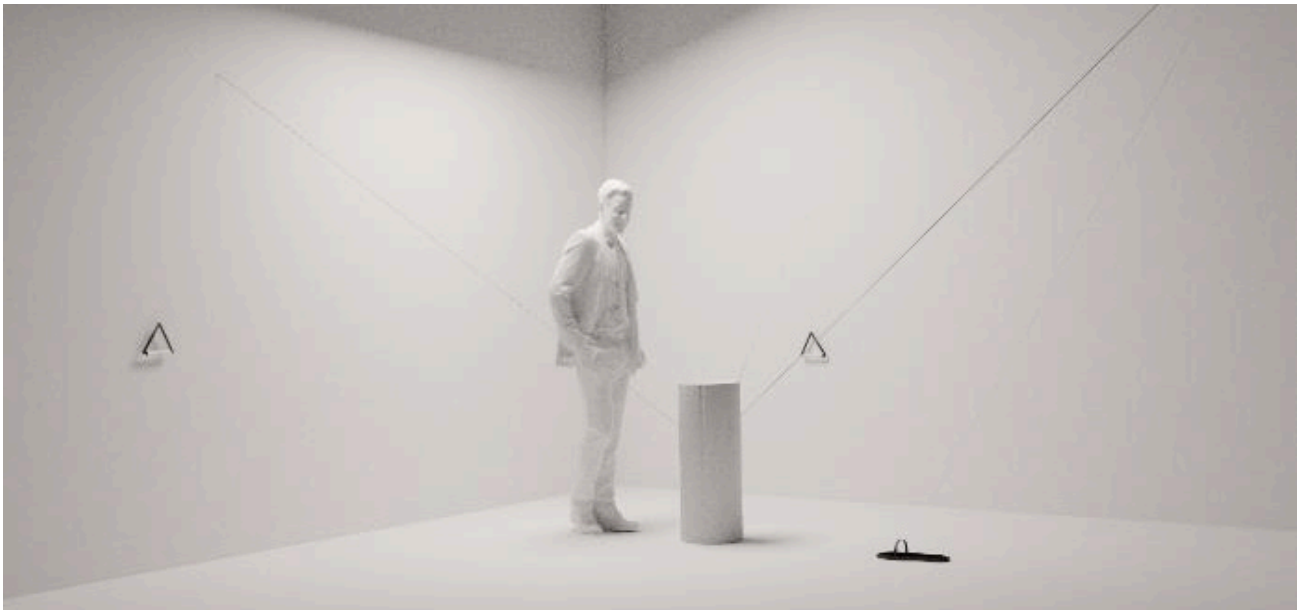

Fig 5. "{Terra, Eu}" 3D Model. Ricardo Imperial

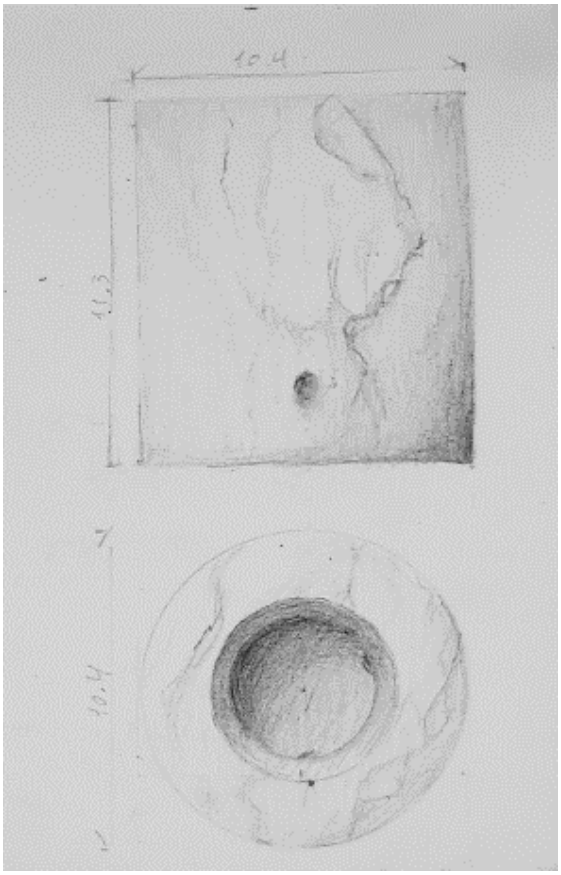

Fig 6. "{Terra, Eu}" Drawings. Ricardo Imperial

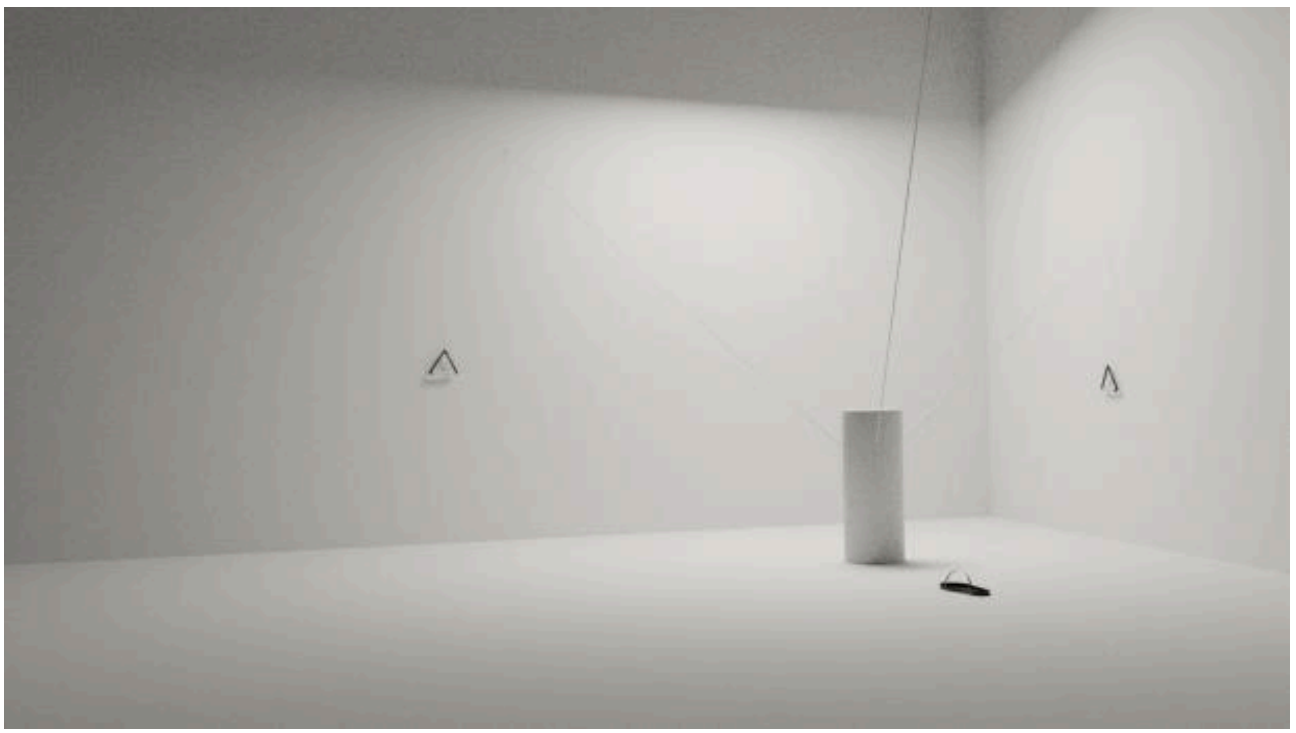

Fig 7. "{Terra, Eu}" 3D Model. Ricardo Imperial

“{Mão, Vida}”, {Hand, life} – 2023

This work consists of two elements, through a constructive process, the largest element is a construction made with five reused steel plates, two 140mm x 100mm for the realization of the work a mini angle grinder (125mm) was used to cut the metal to shape, as well as a gas MIG welding machine to join all the parts together as well as the internal 20 mm square bar structure in the centre of mass of the work. A vinegar, salt and hydrogen peroxide mixture were used for the rusting process of the outer layer.

For the second piece a modular support part is made of 18 mm round metal bar with 30 mm in length and a cross pattern made of the same bar with a total end-to-end size of 10 cm in each line of the cross. It was made using a Gas MIG welding machine and a mini angle grinder (125mm) with a metal cutting disk and a metal griding disk.

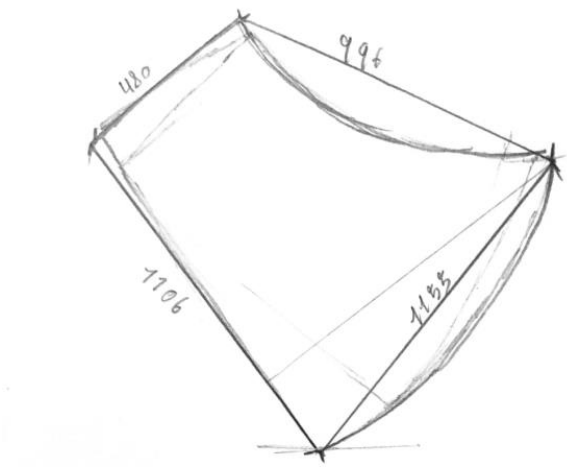

Fig 8. “{Mão, Vida}” Drawing. Ricardo Imperial

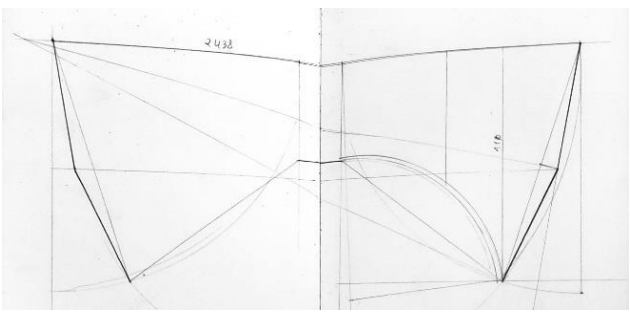

Fig 9. “{Mão, Vida}” Drawing. Ricardo Imperial

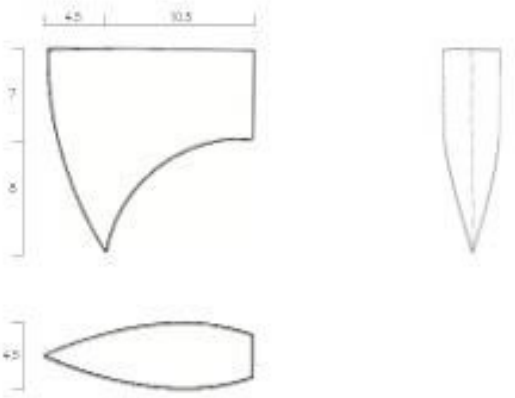

Fig 10. “{Mão, Vida}” Drawings. Ricardo Imperial

Fig 11. “{Mão, Vida}” lateral segmentes. Ricardo Imperial

Fig.12. “{Mão, Vida}” Supporting point experiment. Ricardo Imperial

“The first gesture” – 2023

For this experiment a close approximation to the classical sculpture making approach was used as an inspiration. When researching about the proportions and the properties of the eponychium in foals the first steps were to study the anatomical and practical uses on what it was in the foal’s anatomy as well as drawing the hoof cover to understand the physiology of the foal leg. After the drawing process we started by carving in recycled glued together plaster blocks that had been left over of past works in the general shape that was to be the final proportions utilizing a metal saw and metal cutting/modelling stick as well as wet sandpaper of the final phases going from P32 to P600.

With a rough block of Italian marble called “Calacata” that the quarry was throwing away, the block was cut into the rough proportions the leg has when divided in three pieces. For this an angle grinder (240) was used. After this the general shapes were repeatedly drawn onto the 3 separate stone blocks and generally carved down until the general shape was visible. To simplify the explanation, we will call the part with the hoof the part number one (1) the middle part the part number two (2) and the bottom part the number three (3). All of them were levelled with each other using a stone flat carving on a mini angle grinder(125mm) disk with a drill one hole was drilled in the centre of the connection between part one (1) and part two (2) as well as part two (2) and part three (3) with a 6 mm stone cutting drill with a 35mm depth in all of them. Afterwards using stone glue, the pieces were united in their correct orientations following the studies made and let it dry. By using direct comparison with the plaster model, previously made with improvements where possible, we started to carve the finer shape until a satisfactory point reached and started polishing the outer shape with an electric sander starting with P32 to P120.

After this we made three support mounting holes at the bottom of the piece with a 6mm stone drill bit and a drill to make sure we wouldn’t introduce unnecessary vibrations on the eponychium cartilages due to their fragility after these were made. With this said the next step was to start drawing the cartilages on the upper hoof part and with a straight grinder and a 40mm cutting diamond wheel we started carving the general shapes as much on the surface as possible going deeper and deeper as each pass made the forms more defined. Due to the thickness and size of the cutting wheel the optimal succeeding step was to change to a Dremel and do the finer deeper work with it with diamond plated milling ends such as a 0.5mm cylindrical drum shaped bit and a 0.3 mm spherical bit. For the final details a diamond plated rasp as well, a stainless steel purposefully made was used in order to clean the deeper corners of where each cartilage meets. Afterwards everything was sanded with wet sandpaper to P120.

Fig 13. “The first gesture” – Drawings. Ricardo Imperial

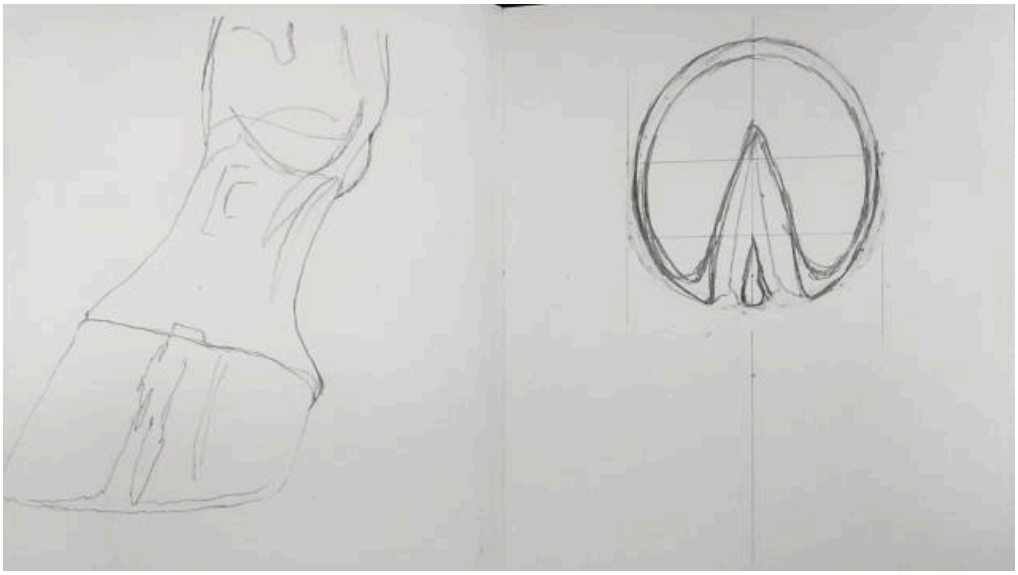

Fig 14. “The first gesture” – Drawings. Ricardo Imperial

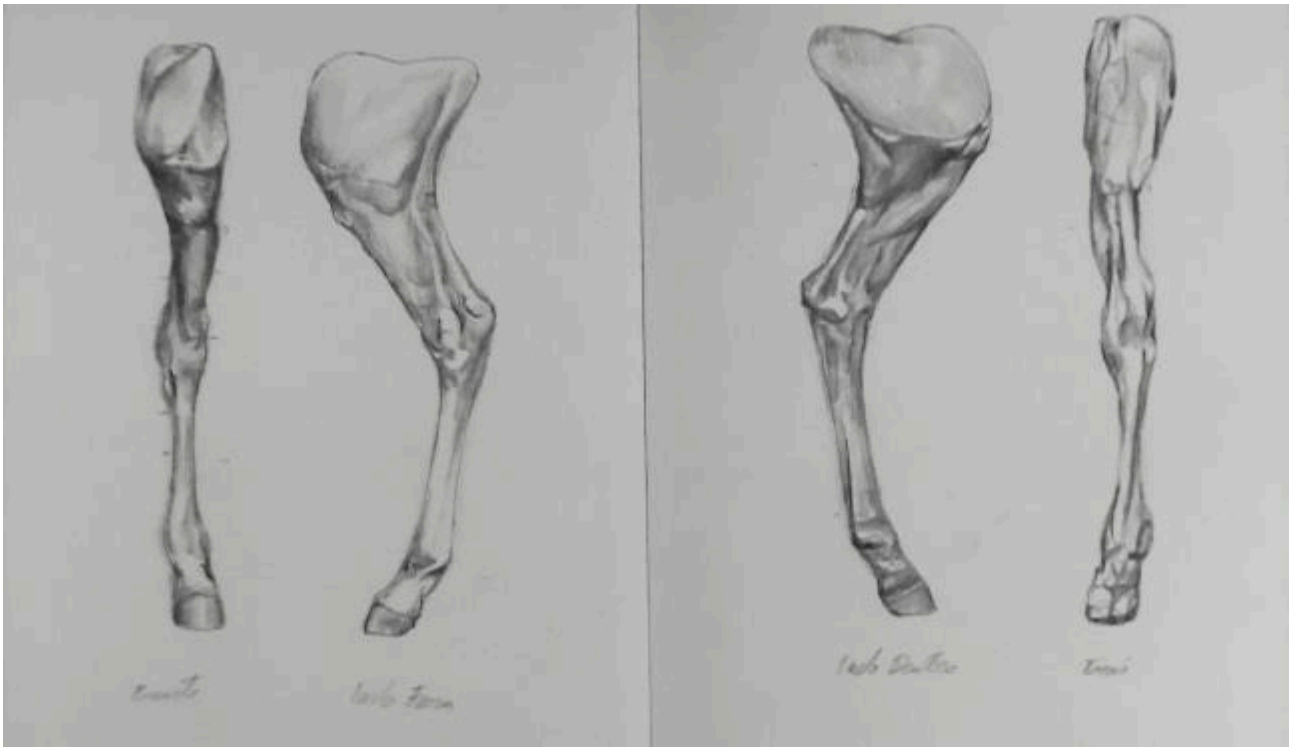

Fig 15. “The first gesture”- Drawings. Ricardo Imperial

Fig 16. “The first gesture” -Plaster maquete. Ricardo Imperial

Fig 17. “The first gesture” – final Plaster maquete. Ricardo Imperial

Fig 18. “The first gesture” – stone progress. Ricardo Imperial

Fig 19. “The first gesture” – stone progress. Ricardo Imperial

Fig 20. “The first gesture” – stone progress. Ricardo Imperial

Fig 21. “The first gesture” – stone progress. Ricardo Imperial

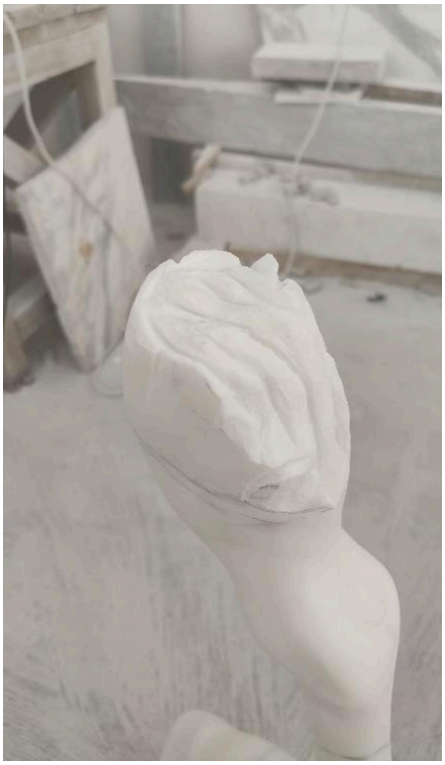

Fig 22. “The first gesture” – stone progress. Ricardo Imperial

Fig 23. “The first gesture” – stone progress. Ricardo Imperial

Fig 24. “The first gesture” -3D Model – Blender. Ricardo Imperial

3. Results

3.1 ”{Terra, Eu}”
{Earth, I} -2022

Fig 25. ”{Terra, Eu}” - Final experiment. Ricardo Imperial

Fig 26. ”{Terra, Eu}” - Final experiment. Ricardo Imperial

Fig 27. “{Terra, Eu}” - Final experiment. Ricardo Imperial

This work plays on the more physical aspect of tension and a direct interaction between the human hand and the marble cylinder as, through the pulling of cables, we manage a direct influence over the movements of the object and the water inside it. This forces an attempt to reach an equilibrium that’s by the nature of our movements, unnatural and will make the water spill and move the marble in a hard to predict way.

This plays on the human controlling nature and the influence we attempt to have on everything, even the forces we can’t directly predict such as the natures natural response making this piece a constant battle.

3.2 “{Mão, Vida}”

“{Hand, Life}” – 2023

Fig 28. “{Mão, Vida}” - Final result. Ricardo Imperial

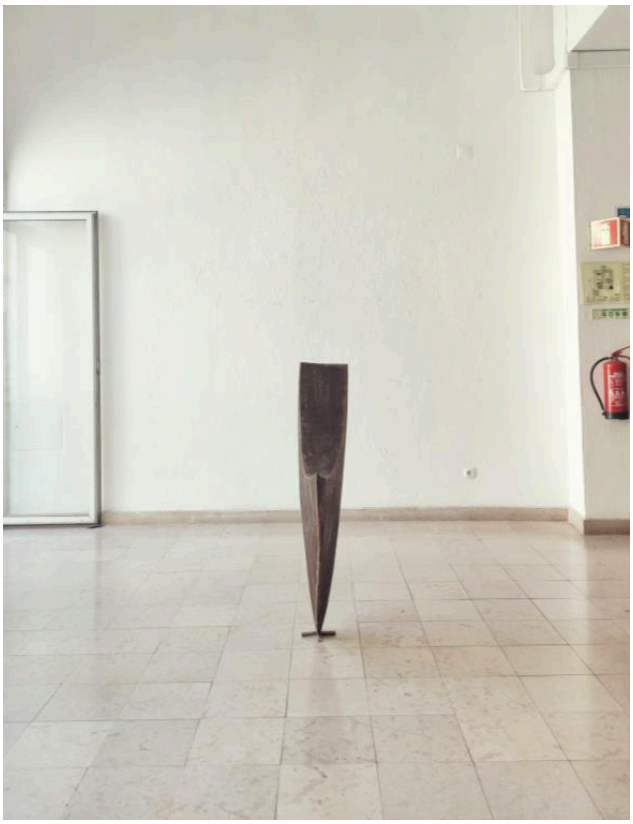

Fig 29. “{Mão, Vida}” - Final result. Ricardo Imperial

“{Mão, Vida}” is an exploration of objects whose tension comes not only from a physical aspect, but also from an emotional one. About the way in which human beings manage to create a connection with their environment in a way that plasticizes it in the sense of the constant and repetitive artifice of matter in favour of their well-being, their proportions and shape.

By breaking the proportions of the shape of an axe head and deconstructing it not only in its functional aspect but also through the very position in which it is located, a reinforcement of the precariousness of the balance of the shape that suggests by its origin suggests a cutting object and therefore aggressive.

Not proposing the work to be a symbol, the significance of the axe as an intermediate object of man's interaction with nature, the work also had in its origin a reflection on the climatic influence that we have created and in the same way that the work is in a perceptibly balanced Precarious, so is the world we are exploring.

3.3 “The first gesture”

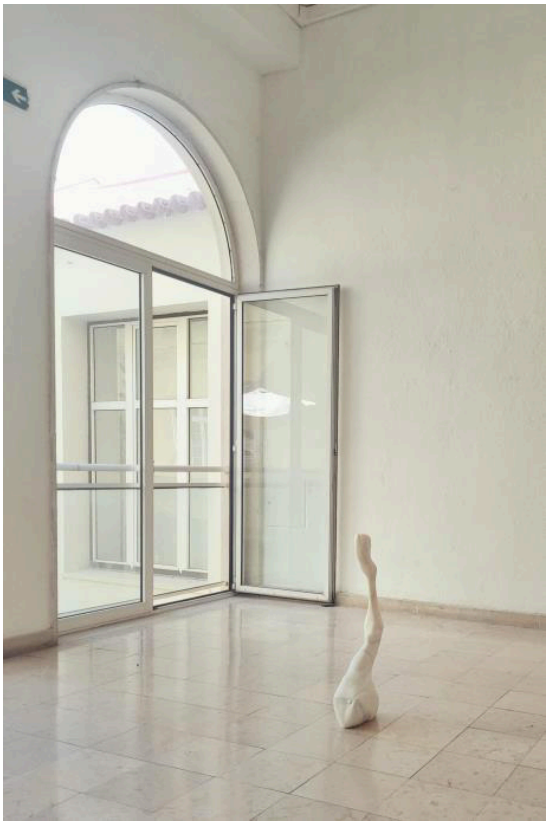

Fig 30. “The first gesture” Final result. Ricardo Imperial

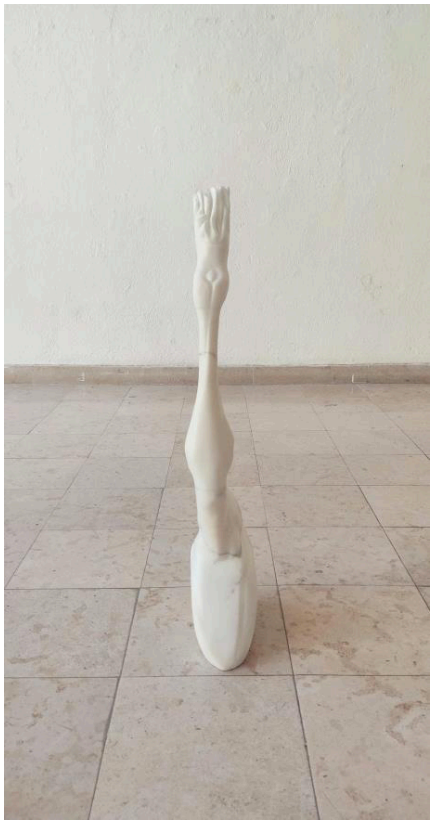

Fig 31. “The first gesture” Final result. Ricardo Imperial

In our exploration of tension as an emotional quality, we found a compelling focal point when contemplating the fundamental notions of life and death. One of the intriguing elements we encountered is the foal slipper, also known as the horse's eponychium. This is a soft keratin covering that envelops the foal's hoof, serving a critical role in preventing potential harm during birth. Specifically, it acts as a protective barrier, minimizing the risk of injury to both the mother and the foal within the birth canal. The absence of this protective structure significantly escalates the chances of dire consequences for both.

What makes this anatomical formation particularly captivating is its distinct, non-trivial shape and its relatively obscure nature in common knowledge. It stands as a poignant symbol of the intricate balance between life and death.

While we acknowledge the existence of this tension in the context of life and death, a deeper examination of the emotional connection it engenders prompted us to consider a paradox. From the perspective of the mother horse, the importance of the foal slipper's existence is essentially non-existent; her experience is characterized primarily by the emotional dimensions of pain and childbirth. The true source of tension lies in the eyes of the observer who comprehends the potential risks and has previous experiences to draw upon. It is within this human perspective that tension thrives, where the foal slipper, while physically vital to the animal, becomes a catalyst for human apprehension and emotional tension.

Fig 32. “The first gesture” Final result. Ricardo Imperial

4. Discussion

4.1 Interpreting the Sculptural Works

{Terra, Eu}" {Earth, I} - 2022:
In summary this experiment led to find a range of balances that could be created between our physical limitations and movements with the sculpture through direct influence. The relationship this piece has with balance is forced through the use of balance between the water and the persons movements, always with the constant fight between the weight of the stone on the body as an extension mimicking what can been seen being done by the human to the total of everything that surrounds it at the current time.

"{Mão, Vida}" {Hand, Life} - 2023:
This work explores the emotional and physical aspects of tension. In this sculpture, where the deconstruction of an axe head challenges its functional and symbolic aspects the human as an artificer always changes everything surrounding him serving himself despite everything else. The sculpture of this axe head that's unusable and visually unstable was an attempt at exploring the tension of the impact we have on the world, as this is in a fragile state of balance so is the world we keep changing at a faster pace than if humans didn't exist.

"The First Gesture" - 2023:
The foal slipper, as a symbol of the delicate balance between life and death. This sculpture invites viewers to explore the emotional tension associated with this anatomical feature. While the horse experiences the birth process primarily from a physical perspective, human observers are confronted with a different reality. The foal slipper becomes a source of concern for those who understand its importance, serving as a catalyst for emotional tension. This paradox underscores the divergence between the animal's innate understanding and the complex emotional responses of human observers, emphasizing the intricate relationship between human perception and the natural world.

4.2 Broader Implications

Throughout the course of this research, the scope grew well beyond our initial expectations, leading to a deep learning experience. This journey was especially marked by a steep learning curve, notably in tackling the intricacies of extensive welding on thin, corroded metals, as seen in the axe experiment, and fine stone working in the foal's slipper's experiment. As we went deeper, this exploration not only broadened our understanding of tension in sculpture and the differences between what a world without humans and a world with humans is but also paved the way for future investigations. We ventured into innovative techniques mixed with more conventional techniques for metal and stonework, applied specifically to sculptures dealing with tension, offering fresh avenues for further study.

In this trajectory of research, we considered the ever-evolving dynamics of our contemporary world, particularly in contrast to non-human forms found in nature, such as the axe head. This shift prompted us to reevaluate the very essence of representation and mimesis. The replication of reality now challenges conventional notions of what is real in a world where the definition of real and the mixing of "fake" is harder and harder to define. For instance, the unconventional yet fact-based portrayal of a foal's hoof fundamentally alters our perspective on the birthing process and encourages reflection on the movements of both the horse and the foal's hoof.

These sculptures actively engage with viewers and participants, often fostering intimate interactions. {Terra, Eu}" relies on direct physical contact, drawing individuals closer to what might typically be considered disconcerting, the same way the work "The first gesture" does as a horse's birth, while generating tension through their interactions with the artwork. Similarly, the axe head sculpture employs intricate details to mentally stress viewers, challenging their perception of balance and the potential for movement. This proximity between the audience and the artworks, where the viewer becomes an integral component of the experience, represents an essential progression in sculpture. It fosters a more connected and connective approach to art, reshaping the viewer's role into a crucial aspect of the artistic

encounter. These insights emerged through interdisciplinary approaches bridging art and science, permitting us to push the boundaries of artistic expression and human perception.

4.3 Limitations and Future Research

After everything is said and done to reach these three final conclusions a lot of failures had to be made, a lot of “pre ideas” had to be done, sculptures such as the ones made had a very big-time constraint due to the learning process that it took to be able to reach them even after all the research to make the final objects. Due to the ever-expansible path of sculpture there was a need to learn a lot of new processes that were not previously known to us and the disparity between theory and practice became a much wider valley than what it seemed from a far.

Having said so, the field has yet to be as explored as much it allows to, it is in our belief that the relationship sculpture can have with the virtual worlds we are starting to create could be a possible path to an interaction between what we know to be real and what we see as being natural.

There is still a lot of possibilities on different emotional interaction types that are part of nature that we see as a motif/ evoker of tension which through reading more books on psychology could led to several interesting experiments.

The van diagrams of these three areas is still one too ever expanding with the fast passed, evolving world we live in, for me to say that what was done, created as much of an impact on the subject as hoped but it is believed that it is a relevant path and could be one possible way of creating change in the minds of people through the awareness of the split that it is believed to be happening between nature and humans.

4.4 Conclusion

In summary, our expedition into the intricate relationship between sculpture and tension between human and nature has yielded insights and perspectives worthy of consideration.

We think the main revelation has been the important role tension plays in the realm of sculpture. It infuses artworks with a dynamic energy and compels viewers to engage not merely as passive spectators but as active participants. Sculptures such as {Terra, Eu}”, "{Mão, Vida}" and "The First Gesture" serve as living expressions of equilibrium, control, and the nuanced interplay between humanity and nature.

Our exploration has also extended the horizons of sculptural practice, embracing and mixing innovative and conventional techniques like 3D modelling, metalworking, and stone carving. These avenues promise uncharted territories for future artistic endeavours in this topic.

The research has made us rethink conventional notions of reality and representation in response to the ever-evolving dynamics of our contemporary world. We are challenged to contemplate the far-reaching consequences of our actions within the delicate equilibrium of our environment.

Yet, we acknowledge the limitations we faced, including constraints on time and the vast expanse of the sculptural landscape. The terrain of emotional interactions within art and the exploration of art in virtual realms remain largely uncharted, awaiting future inquiry.

In conclusion, our research serves as a point of departure rather than a terminus. We aim to do further investigate the intricate intersection of art and science, as to deepen our comprehension of our place within the natural order. The pursuit of balance and harmony in our interactions with the environment remains alive.

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