The Shape of Becoming

Olivier Blom

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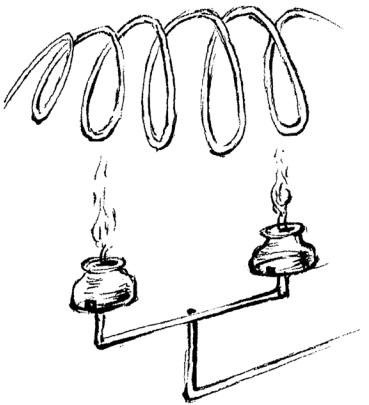


Fig. 1

Prologue - On Wonder, Magic & Memory

Prologue - On Wonder, Magic & Memory

I didn't begin with a question. I began in awe. With a Material, a movement, a moment when something seemingly inert responded. Not like a machine, but like a memory. I found out about NiTiNol: a metal alloy made from Nickel and Titanium, known for its shape-memory property, the ability to return to a pre-defined form after deformation when exposed to heat. I was struck by its poetry. It 'remembered'!

Initially, I wanted to write about alchemy. About magic, transformation, and the metaphysical attraction I often feel in contact with the material world. This felt rich and deeply relevant. The challenge was how to place it beside science, how to honour it as a poetic proto-science without losing clarity or slipping into pseudoscience.

"Start with the physical" my mentor said, "Be precise". And so I did.

What began as a symbolic impulse became a geological, astronomical, and physical journey: from the stellar birth of Nickel and Titanium, to their slow emergence from Earth's crust, to their fusion into a modern alloy with extraordinary properties and finally, to my own use of that alloy in a kinetic installation (PerPendulum), where fire, memory, and motion unfold like a ritual.

As I traced the line of NiTiNol, its science, its history, the wonder didn't disappear. Sometimes it deepened into something vivid and present; other times, it faded, slipping through my hands like something fundamentally ungraspable.

I became interested in what lies beneath explanation. I found myself standing between two worldviews: materialism, which sees reality as made up of physical particles and forces, and idealism: which proposes that consciousness or mind is the ground of all being. Between these poles is a space I often find myself in as an artist: the tension between what

we can measure and what we feel, what we can define and what we intuit.

In NiTiNol, I found not just a metal, but a metaphor. A realm where transformation becomes visible. A place where the ancient Hermetic idea "As above, so below; as below, so above."[1] echoes across scales: the fusion of atoms in dying stars; the shifting of tectonic plates; the bending of a memory wire in response to heat.

Is this nature's version of what we call 'memory'? Is it something we percieve as 'intelligence'? Is it poetry in metal, or just thermal physics?

This thesis is not about proving anything. It is about mapping a journey, through stars, through time, through meaning. Through my own hands. It is an attempt to honor a Material not just as useful, but as meaningful. To let it speak. Because sometimes, if we listen closely, Matter speaks. And sometimes, it remembers.

1 The Three Initiates, The Kybalion: A Study of the Hermetic Philosophy of Ancient Egypt and Greece (Chicago: Yogi Publication Society, 1908), 23.

The Cosmic Origin of Metals

To trace the journey of metals like Nickel and Titanium, which are the contents of the NiTiNol alloy, we must start at the very beginning; at the origin of time, space, and matter itself. The story begins with the Big Bang, an event that (as far as we know) occurred around 13.8 billion years ago. In a fraction of a second, the universe expanded from an unimaginably hot and dense dot into the rapidly cooling cosmos that would eventually give rise to galaxies, stars, planets and metals.

In the earliest moments after the Big Bang, temperatures were so extreme that no atoms could form. But within minutes, as the universe cooled. The first atomic nuclei; Hydrogen, Helium, and traces of Lithium[2], were forged in a process known as primordial nucleosynthesis. These light elements set the stage for the more complex atomic structures that would later emerge inside stars.

2 NASA, "Universe: Overview," NASA Science – Astrophysics, accessed March 14, 2025, https://science.nasa.gov/universe/overview/.

The Periodic Table: A Cosmic Map of Matter

To understand where metals come from, we must first understand what they are. In 1869, the Russian chemist Dmitri Mendeleev invented the first widely recognised version of the Periodic Table and, as the story goes, it came to him in a dream. After days of obsessively working to organise the known elements, he fell asleep at his desk and saw the elements fall into place, not randomly, but in a structure that revealed their relationships. "I saw in a dream a table where all the elements fell into place as required," he wrote. "Awakening, I immediately wrote it down."[3] What makes this story more than legend is that Mendeleev not only arranged the known elements by weight and behavior, he also left gaps, predicting elements yet to be discovered. The table was not just an act of observation, but of intuition. A vision of hidden order, surfacing through sleep.

The Periodic Table is not just a chart. It is a symbolic map: a charting of the universe's material memory, showing the paths through which simple atoms transformed into complex elements.

3 Paul Strathern, Mendeleyev's Dream: The Quest for the Elements (New York: Pegasus Books Ltd., 2001), 238.

Periodic Table of the Elements

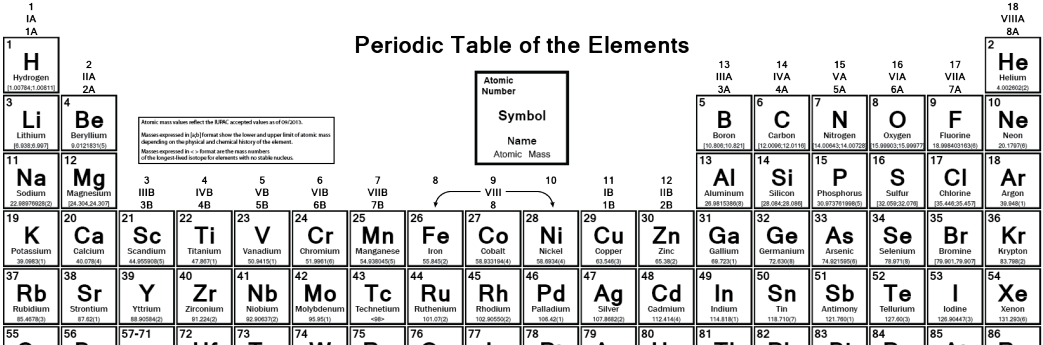
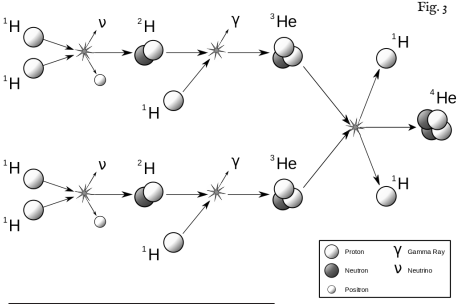


Fig. 2

Stellar Transformations: The Forge of Elements

The story of NiTiNol does not begin in a lab or a furnace, but billions of years ago inside of stars. Before diving into the transforming furnace of stars, a brief refresher: everything around us is made of atoms. An atom consists of a nucleus, an inner core containing protons (positively charged) and neutrons (neutral), surrounded by electrons (negatively charged particles) that circle the core. The number of protons determines what element it is: for example, Hydrogen has one proton, Helium has two, and so on.[4]

Fig. 3



4 John T. Moore, Chemistry for Dummies (Indianapolis, IN: Wiley Publishing, 2003), 53–64.

In the beginning, the universe held only the simplest elements: Hydrogen and Helium. It took the unimaginable heat and pressure of stars to fuse these into heavier elements through a process called stellar nucleosynthesis. Over millions of years, stars acted as cosmic forges, combining atomic nuclei into new forms: Nitrogen, Aluminium, Calcium and up to Iron, which is the most stable element produced through fusion.

To create elements like Nickel, conditions even more extreme than the inner workings of a star are needed. Heavier elements than Iron are only formed in the death of a star. It happens when massive stars explode at the end of their life, in supernovae, where temperatures can go beyond billions of degrees Kelvin. It is hard to even imagine those conditions, these moments of cataclysmic collapse and rebirth, are fusing particles into dense, complex atoms under intense pressure and heat.

The Journey to Earth

After their creation, these metals did not remain in stellar cores. The supernovae distributed them into space, scattering them across galaxies in clouds of dust and plasma. Over time, these clouds gathered and cooled, forming new stars, planets, and eventually our solar system.

Roughly 4.5 billion years ago, the Earth began to form. As heavier elements sank into the center of the molten planet, Nickel became part of Earth's dense core, bound to Iron. Titanium, less dense and more chemically reactive, remained in the crust, bonded with Oxygen in minerals like Ilmenite and Rutile.

I - The Cosmic Origin of Metals

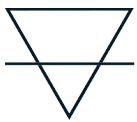


Fig. 4

EARTH, FIRE, ALCHEMY

In history the earth was often seen as static, but as we know now, it is a record of movement: tectonic shifts, volcanic pulses, mineral migrations.These processes slowly brought Nickel- and Titanium-rich deposits closer to the surface, where humans could begin to notice, use, and eventually reimagine them.

Before we mastered metals, we mastered fire. To control fire was to gain a kind of divine power, the ability to reshape the world, to alter the properties of matter, to summon transformation. As stars transmute light elements into heavier ones, humans learned to transmute rock into gleaming metal. This transformation required fire, patience, and a kind of belief, before it was fully understood.

In many ancient cultures Fire was sacred: a symbol of spirit, purification, and an invisible forces that move through all things. In Hermetic and alchemical thought, Fire was one of the four elemental principles, the active agent of transformation. But while Fire was the catalyst, Earth was the arena in which that transformation could take root.

Where Earth and Fire met, humans found the path to metallurgy. Somewhere between practical necessity and sacred acts, early humans learned to harness Fire's transformative power, not only for warmth and protection, but eventually for extracting metals from stone. The earliest smelting of Copper, then Bronze and subsequently Iron marked a radical shift in human consciousness. We turned Earth's hidden ores into tools, weapons, ornaments. Each metal brought new capacities, new worldviews, whole epochs were named after them: the Copper Age, the Bronze Age, the Iron Age.

In the alchemical and Hermetic traditions, Earth represents matter, form, and stability[5], the slow, dense plane of reality that holds all potential within it, not passive, but patient. In ancient cosmologies, Earth was the womb of creation, the ground of being, the place where things decompose and are reborn. It holds the memory of cycles: growth, decay,

5 Aristotle, On Generation and Corruption, book II, parts 2–3, trans. H. H. Joachim, in The Complete Works of Aristotle, ed. Jonathan Barnes (Princeton: Princeton University Press, 1984).

return. To the alchemists, Earth was the prima materia, the raw, undifferentiated material from which all things arise. It was the darkness before the spark, the stone before the strike. Where Fire is upward and expansive, Earth is downward and inward. Fire seeks transformation; Earth holds it in potential.

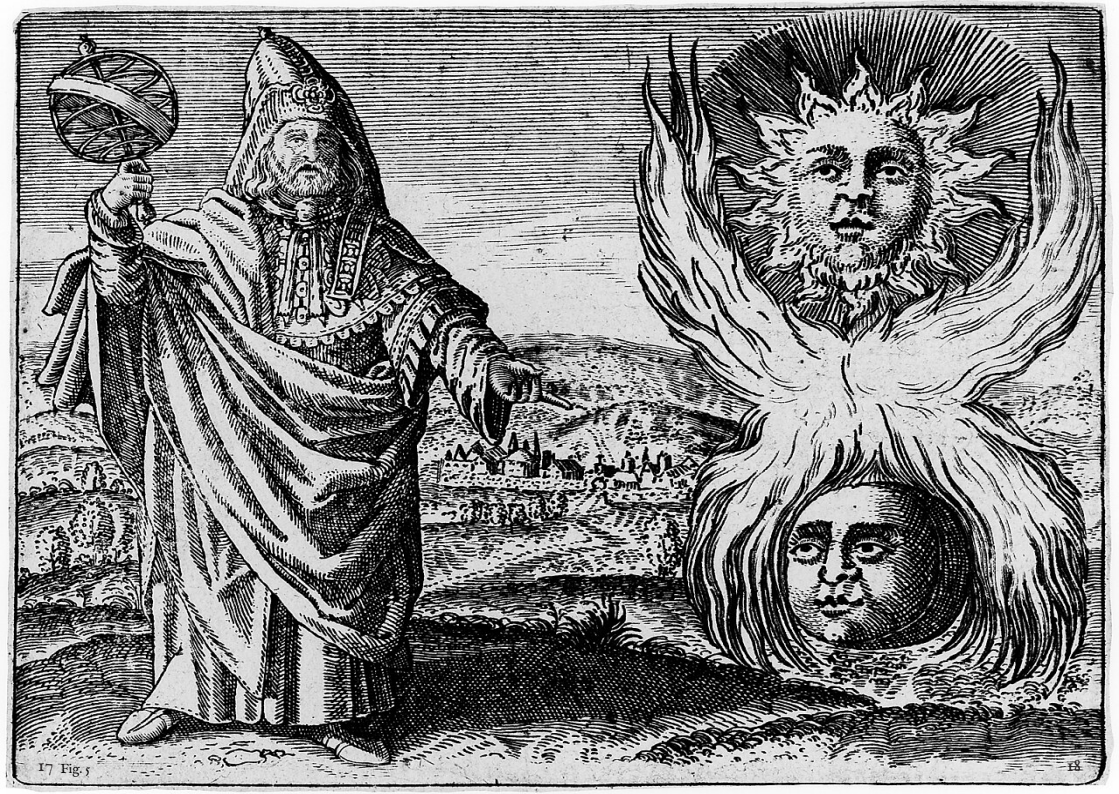
I find myself, between these two principles. Between the measurable and the mystical, the solid and the volatile. Between Earth's structure and Fire's motion. Earth shows us that transformation must begin somewhere. That even the most ephemeral flicker needs something solid to burn.

Alchemy

Alchemy is often misunderstood as merely a primitive attempt to turn Lead into Gold. But it is much more than that. Emerging in late antiquity around the third to fourth century and flourishing through the Middle Ages and Renaissance, alchemy was a blend of experimental science, natural philosophy, and spiritual symbolism. By the fifth century, texts and practices began to crystallise into a recognisable tradition that would influence both Islamic and European thinkers for centuries.

To the alchemist, every material change held a metaphysical truth. Metals were not inert substances but beings in process, each representing a stage of purification, balance, or evolution. Lead symbolised heaviness, potential, shadow. Gold was radiance, perfection, light. To heat, dissolve, or distill a substance was not merely to act on it. It was to participate in its unfolding. Transmuting metal was also about transmuting the soul.

Alchemists were seeking to understand the hidden life of matter. It was about revealing essence through transformation, about purifying something toward its true potential. This is where the symbolic and the material blur. Metals were never just objects. In ancient alchemical systems, they corresponded to planets, emotions, virtues, and vices. Iron was associated with Mars and war, Mercury with fluidity and mind, Gold with the sun and perfection. To work with a metal was also to work with its metaphor.



17 Fig. 5

The old dream was not entirely wrong. Today, modern nuclear physics can, in principle, turn Lead into Gold. In high-energy particle accelerators, by altering the nucleus of a Lead atom, Gold can be produced, though only in microscopic amounts, and at a cost far greater than the metal's worth. The dream was fulfilled, in a sense, but its meaning changed. The metaphor outlasted the method.

Some say we now are living in the Silicon Age, an era defined not by metals, but by Silicon, a metalloid. metalloids are elements that blur the line between metals and non-metals, often possessing properties of both. Silicon conducts electricity like a metal, but behaves chemically more like a non-metal, making it the perfect medium for semiconductors, and thus the heart of modern digital technology.

Transmutation as a Way of Seeing

Alchemists were not only trying to refine metals. They were also engaged in the transformation of the self. At its heart, alchemy was a worldview, one that saw matter and spirit as reflections of the same underlying reality. This worldview was rooted in Hermeticism, a philosophical tradition that took

shape between the second and fourth centuries. It was attributed to Hermes Trismegistus, a legendary fusion of the Greek god Hermes, messenger and guide between worlds, and the Egyptian deity Thoth, guardian of wisdom, writing, and the Moon.[6] Hermeticism held that the universe is a living system, bound together by correspondence. What happens above is mirrored below. What is outer reflects the inner. This principle, "as above, so below", became central to alchemical thought.[7]

Alchemy may not be science, but it was never only superstition either. It was a language of transformation before the periodic table. In the light of the forge or the glow of a candle, perhaps it still is. The alchemists believed that all things are made of the same substance, and that transformation reveals truth. Modern science may no longer speak of essences, but reveal the same principle: all things are in transformation, born of processes long before human awareness, and continuing long after it.

The moment we extract metal from ore, we begin a relationship, not only with the material but with the

6 Brian P. Copenhaver, Hermetica: The Greek Corpus Hermeticum and the Latin Asclepius in a New English Translation, with Notes and Introduction (Cambridge: Cambridge University Press, 1992), xiii.

7 The Three Initiates, The Kybalion: A Study of the Hermetic Philosophy of Ancient Egypt and Greece (Chicago: Yogi Publication Society, 1908), 23.

concept of transformation itself. And in doing so, we become part of the story of the metal. We don't just use it, we awaken it. The process changes us too. When I work with NiTiNol, I think about this: how many layers of transformation it has passed through nuclear, planetary, chemical, and finally, artistic. Each time, it becomes something else. But it also returns, in form and in function.

The Nickel and Titanium we extract today carry in them a memory, a material inheritance. They are shaped by gravity, heat, and time, now waiting to be touched by the heat of a flame or the bend of a hand. They are not just raw Materials, but also witnesses. In NiTiNol, they become more than witnesses, they become performers that embody the unfolding process of energy becoming form, and form returning to itself, as I will unfold later.

The transformations I trace in this thesis; stellar, geological, chemical and artistic can be seen as part of a longer, symbolic lineage. A kind of modern alchemy. And perhaps, in the story of NiTiNol, a contemporary reflection of that ancient dialogue between matter and meaning, form and fire.

II – Earth, Fire, Alchemy

Fig. 6

The Story of NiTiNol

Titanium was named in 1795 by Martin Heinrich Klaproth[8], who was struck by its fierce bond with Oxygen, a chemical resilience so strong it defied easy separation. To him, this elemental tenacity echoed the Titans of Greek mythology: ancient, primal forces of nature, powerful and immovable. He gave the metal their name, not for brute strength, but for its unwavering hold. Nickel, named earlier in the mid-18th century by Swedish chemist Axel Fredrik Cronstedt[9], carries with it an older, more enchanted name: kupfernickel, or "devil's copper." German miners in the 17th century gave it this name after encountering a reddish ore that looked like it would yield copper, but stubbornly refused to do so. After failed attempts to process it some of the workers started to get sick. They blamed the trick on a mischievous underground spirit named Old Nick

8 Royal Society of Chemistry, "Titanium – Element Information, Properties and Uses", accessed March 20, 2025, https://periodic-table.rsc.org/element/22/titanium.

9 Royal Society of Chemistry, "Nickel – Element Information, Properties and Uses," Periodic Table, accessed March 9, 2025, https://periodic-table.rsc.org/element/28/nickel.

or Nickel[10], as if the metal itself had a will to deceive. In a way, these two metals complete the story that early alchemists could only dream of: the fusion of strength and lightness, of memory and motion.

It is 1961, at the U.S. Naval Ordnance Laboratory, a curious alloy was brought into existance: a combination of Nickel and Titanium. Scientists were trying to develop a strong, durable, corrosion-resistant material for military purposes. No one anticipated the wondrous properties this new material had in store.

The discovery happened almost by accident. As the story goes, during a routine demonstration, a sample of the alloy, a simple strip of wire, was bent out of shape. Then, as one of the scientists passed a flame beneath it, the wire miraculously springed back to its original form. Everyone was stunned! This was no ordinary reaction; it seemed alive.[11]

NiTiNol, named for its elemental origins (~55% **Ni**ckel and ~45% **Ti**tanium) and the **N**aval **O**rdnance **L**aboratory where it was discovered, revealed a

10 Virginia Heffernan, "Old Nick's Cursed Metal," CIM Magazine, accessed April 30, 2025, https://magazine.cim.org/en/in-search/old-nicks-cursed-metal/. (Cambridge: Cambridge University Press, 1992), xiii.

11 Arjun Ramesh, "The Shape Memory Chapter: The Deadpool of Alloys—NiTiNOL," Medium, March 18, 2019, https://medium.com/sigma-xi-vit/the-shape-memory-chapter-the-deadpool-of-alloys-nitinol-b70ddcac5e30.

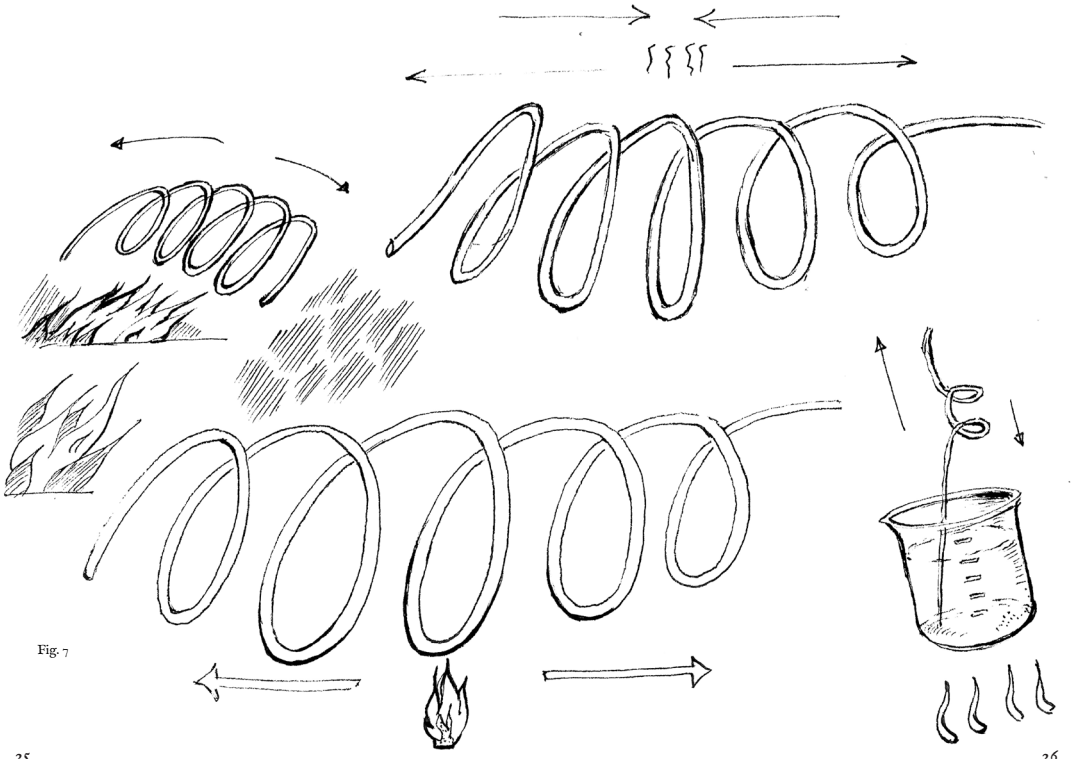


Fig. 7

peculiar behavior. It remembered.
Its memory lies in the structure of its atoms. A crystalline structure refers to the way atoms are arranged in a solid: repeating in geometric, lattice-like patterns. Like a scaffolding of invisible architecture, these structures determine a material's strength, shape, and response to change.

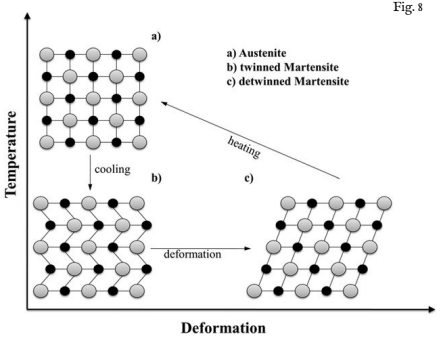
At lower temperatures, NiTiNol enters a state called Martensite, a looser, more distorted crystalline phase that makes the alloy pliable. You might imagine it as a wobbly scaffolding, held together by elastic bands. When bent, the bands stretch but do not snap. The scaffolding flexes, holding a temporary shape. But when heat is applied, those bands contract. The atoms realign, tightening the structure, and the Material returns to its original form.

This is the transition into Austenite, a more ordered, symmetrical state. The lattice straightens and stabilises. What was flexible becomes stiff. What was bent becomes straight again. Like releasing the button of a push puppet, the form reassembles itself.

But this memory is not fixed forever. NiTiNol can be taught a new shape, its memory can be rewritten.

This process, known as training, involves heating the alloy above its transformation temperature while holding it in the desired form. In this high-temperature Austenite phase, the atoms settle into a new lattice arrangement, like scaffolding being adjusted and reinforced into a new configuration. As the Material cools back down into Martensite, this pattern is locked in. From then on, whenever heated again, the atoms will remember their path, snapping back into the trained structure with precision. This phenomenon is known as the shape-memory effect. In this mode, NiTiNol transforms heat into motion and displays how energy becomes form.

Fig. 8



These memory properties are not just a curiosity, they are already shaping our world. In medicine, NiTiNol is used to create self-expanding stents: tiny, mesh-like tubes inserted into collapsed blood vessels in a compressed state. Once inside the body, body heat activates the alloy, and the stent gently expands to restore blood flow, no external force required, just warmth and memory. In robotics and responsive design, NiTiNol enables controlled motion without the need for motors or gears. A thin wire, triggered by heat or current, bends and returns like muscle. This simplicity makes it ideal for delicate or miniature applications, where complexity would be a liability. And in space exploration, NiTiNol is being used in actuators and antenna deployment systems, where its reliable, maintenance-free motion is a major advantage. With fewer moving parts, there's less that can go wrong, especially important when the object in question is orbiting far from the possibility of repair.

But there is another variant of NiTiNol, another mode of transformation that works in reverse. When held just above its transformation temperature, NiTiNol enters a state of superelasticity. In this phase, it can be bent dramatically, far beyond the

limits of ordinary metals, yet it returns instantly to its original shape the moment the stress is released. The deformation is real, but reversible. Under mechanical force, Austenite briefly shifts back into Martensite, an internal softening under pressure. But when the force disappears, the atoms rebound, realigning into Austenite once more. The change happens almost instantly. And something else happens, too: the wire heats up. The energy of motion isn't simply absorbed, it is converted. Movement becomes heat. Release it, and the structure cools as it springs back.

In essence:
Shape-memory NiTiNol converts heat into motion.
Superelastic NiTiNol converts motion into heat.

This is the First Law of Thermodynamics at work: energy is never lost, nor created, only transformed. Matter becomes heat, heat becomes motion, motion becomes heat. Even matter, as Einstein revealed in his famous equation, $E = mc^2$, is a form of energy slowed down, condensed into form.

It happens in stars. It happens in the Sun, our closest and most enduring forge of transformation, where hydrogen becomes helium, and mass becomes energy, released as heat and light.

At some point, we pass a threshold from physics to metaphysics. From observing the movement of atoms to asking what it means to move, to become, to return.

If NiTiNol has shown us something about how matter can transform, then perhaps it is time we ask: what is change itself?

III – The Story of NiTiNol

Fig. 9

What Is Change?

In ancient philosophy, change was more than motion or mutation, it was the central mystery.

Heraclitus, writing in fragments, from a world still enchanted, declared that "everything flows." To him, nothing stayed fixed. All was flux, fire, becoming. "No man ever steps in the same river twice," he wrote, "for it is not the same river, and he is not the same man."

Aristotle, more methodical, gave change a grammar. He spoke of potentiality and actuality, of what a thing could be, and what it becomes.[12] A seed has the potential to become a tree; that potential unfolds through time into an actual form. For Aristotle, change was not a break in identity, but its realisation, the process by which something becomes what it already is, in essence.

12 Jonathan Barnes, Aristotle: A Very Short Introduction (Oxford: Oxford University Press, 2000), 75–82.

NiTiNol, in its way, deeply reflects this idea, in its Martensite phase, it holds a form that appears lost, bent, distorted, unresolved. But the original shape is not erased; it is latent. Heat doesn't impose order from the outside, it releases it. The structure remembers not because it was told, but because it always was.

In modern physics, change is about energy gradients, entropy, and the directionality of time. The Second Law of Thermodynamics[13] tells us that entropy, a measure of disorder, tends to increase. Systems naturally drift toward diffusion, randomness, decay, like when a candle burns: its flame concentrates energy into light and warmth for a moment, but as the wax is burned up, the gases disperse, and the heat dissolves into the room, spread evenly, uncontained, irretrievable. And yet, in open systems, where energy flows in and out, temporary islands of order can emerge. Life itself, after all, is structure drawn from entropy. Complexity arises not in spite of disorder, but through it.

In quantum theory, particles flicker between states of possibility until an observation collapses them

13 William Thomson (Lord Kelvin), On the Dynamical Theory of Heat, in Mathematical and Physical Papers, vol. 1 (Cambridge: Cambridge University Press, 1882), 174–210.

into actuality.[14] This strange behaviour is famously illustrated by double-slit experiment. When individual particles, such as electrons or photons, are fired at a barrier with two narrow slits and no one observes which slit they pass through, they behave like waves, like ripples spreading out when you drop a stone in a still lake. They interfere with themselves, forming a pattern on the screen behind that suggests they travelled through both slits at once. But when a detector is used to observe which slit the particle passes through, the interference pattern disappears. The particle behaves like a particle again, choosing a single path. Somehow, the very act of observation changes the outcome. It is as if, at the quantum level, reality does not commit to a single form until it is observed. Until then, it remains suspended in a state of potential.

Through all of this, ancient and contemporary, runs a shared intuition:

That to become is to cross thresholds.
That change is not destruction, but reconfiguration.
That identity is not fixed, but unfolding.

14 Merriam-Webster, s.v. "Superposition," accessed April 17, 2025, https://www.merriam-webster.com/dictionary/superposition.

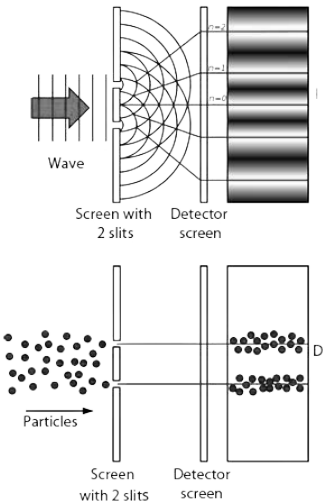


Fig. 10

What Does it Matter?

Is it mute substance, passive, inert, shaped only by external forces? Or does it carry within it a form of intention, a movement toward form, toward memory, toward becoming? For centuries, philosophy has circled around this question, dividing reality into mind and matter, spirit and substance.

The divide is old, ancient, even. Materialism tells us that the world is made of matter, and all things, consciousness included, arise from physical interactions. In this view, there is no hidden soul in a stone, no whisper in the wires. Only particles, laws, and chance.

Idealism, on the other hand, asserts that reality begins with mind, or at least with form. Plato imagined a realm of eternal Forms, of which the material world was only a shadow.[15]

15 Plato, The Republic, Book VII, trans. Allan Bloom (New York: Basic Books, 1991), 193–196.

Most of us live between these poles. We hold a rock and feel its weight, its texture, its history pressed into its form. We know it is matter. And yet, we experience it as more than just a collection of atoms because of what it evokes in us.

NiTiNol unveils this tension. It is undeniably a material. Its behavior can be described in terms of thermodynamics, phase transitions, and lattice structures. And yet, it does something most materials do not: it 'remembers', or at least gives an impression of having an own will.

My point is that it could be interesting, inspiring even, to look at NiTiNol as a bridge between mind and matter, between intention and reaction. It is not thinking, but it is doing. It moves, adapts, recoils, and returns. It follows laws, of course, but displays -in our human eyes- a behaviour like it has preferences. It bends and holds... then lets go. There is a timing, a rhythm, a kind of syntax to its movements. Something close to language, potentially even more poetic. A vessel to explore and express our connection with eternal deep natural processes, making us wander about those in new, intricate yet clear, manifest ways.

This is not magic, but it might be something adjacent to it: a world in which matter is not 'dead' but dynamic. Not inert, but in a process. Perhaps NiTiNol doesn't answer this debate. But at least it can animate it. Its uncanny behaviour invites us to pause, to consider the threshold between doing and being, between motion and meaning. It reminds us that the question of what matter is cannot be separated from how it acts. And how it is seen.

In its responsive behavior, NiTiNol opens a door toward a world where mind and matter may not be opposites, but two inflections of the same unfolding.

V - What does it matter?

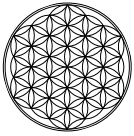


Fig. 11

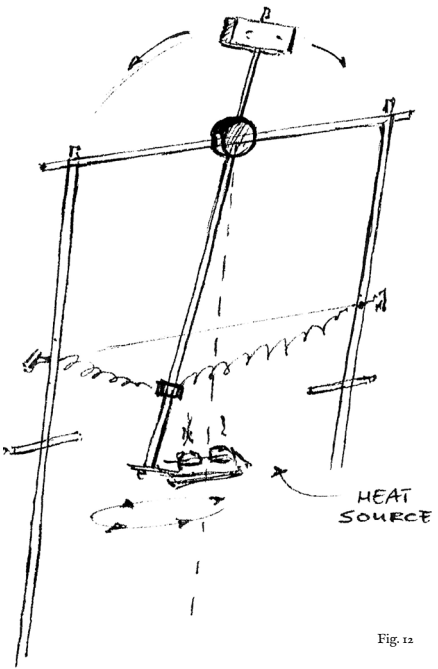


Fig. 12

On Re-enchantment

PerPendulum began not as a project, but as a feeling, an urge to give form to something I could not quite name. I did not want to illustrate a concept. I wanted to evoke an atmosphere. A presence. To let the Material speak, not through explanation, but through gesture.

The installation is simple, but alive with thresholds.

In a darkened room, two small oil flames burn beneath a suspended pendulum.

Above the flames, at opposing sides, a NiTiNol spring waits. When heated, the spring contracts, pulling the pendulum upward to one of its sides. At the peak of its arc, a small magnet triggers a rotating arm at the base of the pendulum, actualising the potential energy into kinetic energy. The arm swings, and shadows stretch across the space. Light moves. Memory moves.

Then the cycle begins again, heat, contraction, lift, release, return. No motors. No code. Just Metal, flame, magnetism, and time.

It is rather a ritual than a machine. Every part remembers. Every part responds. The wire remembers its shape. The flame remembers its warmth. The pendulum remembers how to swing.

PerPendulum doesn't demonstrate a theory, it enacts one. It shows that matter is not mute. That form is not fixed. That transformation can be felt.

In a world increasingly digitised and virtualised, I felt the need to return to material intelligence, to the poetry of cause and effect. The choreography of temperature and tension. The intimacy of matter.

PerPendulum shows us that re-enchantment does not equals 'abandoning science'. It is an incentive to feel it. 'Wonder' is not the enemy of knowledge, it is its foundation.

The metal does not speak in words, but in intervals. In gestures. In a rhythm that feels older than reason. I find myself breathing with it. Waiting for the next

contraction, the swing, the shadow.
It is not dramatic. It is not efficient. But it is alive. Sometimes I sit with the installation in silence. Not adjusting, not analysing... just watching.

I did not build PerPendulum to teach. I built it to remember. To remember the ever present transformation, which we are not separated from, but in the midst of.

Coda - A Pendulum Released

 here is no final word.

Only return.

What began with awe became a journey.

NiTiNol became my thread, drawn from the stars, pulled through Earth, shaped by hand, recovering through fire. It led me to the transformation that runs beneath all things. To the intelligence of form. To a kind of matter that listens.

Are we taught to divide, to sort the world into science and spirit, mechanism and myth? What if those borders are porous? What if explanation is only half the work?

The rest is listening.

The rest is remembering.

The rest is standing still in the presence of something moving... and letting it move you.

Enchantment is not something we have lost, but something we have stopped noticing, all it takes is a pause.

A moment.

A swing.

And so, I leave this not as a conclusion, but as a continuation.

A pendulum released.

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Fig. 1 - Sketch 1 of PerPendum. Drawing by Jordie Rovers, 2025

Fig. 2 - The Periodic Table
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Fig. 3 - Diagram of Nucleosynthesis
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Fig. 4 - Alchemical symbol for the element 'Earth' (public domain)
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Fig. 5 - Illustration of Hermes Trismegistus
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Fig. 6 - Alchemical symbol for the element 'Fire' (public domain)
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Fig. 7 - Sketch 2 of NiTiNOL. Drawing by Jordie Rovers, 2025

Fig. 8 - Illustration of the atomic phase changes of NiTiNOL
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Fig. 11 - Illustration of 'The Flower of Life' (public domain)
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Fig. 12 - Sketch 3 of Perpendulum. Drawing by Jordie Rovers, 2025

Fig. 13 - PerPendulum installation. Photograph by Levi Kramer, July 2024.

Fig. 14 - PerPendulum installation in motion. Photograph by Levi Kramer, July 2024.