



WHITHER SCIENCE (2)
A SCIENCE WITHOUT ORIGINS

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WHITHER SCIENCE? A SCIENCE WITHOUT ORIGINS: NOMAD, MINOR SCIENCE AND THE SCIENTIFIC METHOD (2)

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II. A SCIENCE WITHOUT ORIGINS:

Nomad, minor science and the scientific method

“Hooke has done nothing, and yet written in such a way, as if he knew and had sufficiently hinted all but what remained to be determined by the drudgery of calculations and observations, excusing himself from that labour by reason of his other business, whereas he should rather have excused himself by reason of his inability. For ‘tis plain by his words that he knew not how to go about it. Now is not this very fine? Mathematicians, that find out, settle, and do all the business, must content themselves with being nothing but dry calculators and drudges; and another, that does nothing but pretend and grasp at all things, must carry away all the inventions, as well as those that were to follow him, as of those that went before.”

I. Newton, in *Correspondence*, II

“Even if the aether turned out to be an inertial frame, what right had anyone to assume that this frame was at rest in substantial space, much less that the aether could be *identified* with substantial space?”

L. Sklar, *Space, Time and Spacetime*, p. 197

1. The ambivalent eccentricities of science: Descartes and the Pre-Socratic proto-science

Descartes had failed to compose a multiplicity with his dualist series. He had foreclosed empiricism, and lost sight of the relation between the terms - body and soul, sensation and intellection. But there were eccentricities in **Descartes**, anti-cartesian flights that approach definition of relations that are independent from the terms. It is not simply a matter of acknowledging that sentiment, affect and imagination can and do impact the *Cogito*. As **Jean Wahl** put it - there are in this **Descartes** not only two substances, body and soul, but a third, variously taken as their union, their indistinguishable mix, or “the intermediacy of animal spirits”, functioning as “a third, irreducible substance” ^[1]. For there is also a third **Descartes**. One that steps a little away from the old platonic dualism, where the joy of

a body is always perverse - entails a suffering for the soul - and symmetrically the joy of the soul a suffering for the body. A rare **Descartes** who explicitly posits the idea of *substance* as the basic concept of philosophy, even as he fails to grasp what **Spinoza** would later mean by a real parallelism of soul and body. A **Descartes** who wanted algebra to reach 'clarity', who argued that there must be a 'general science' relating order and measure, a *mathesis* reduced not to conventional mathematics (then arithmetic and geometry), but including the dynamic processes of music, optics, 'the mechanics of motion and work'; a **Descartes** that regards Space as seamless because it is occupied by a plenum of particulate vortices, by a turbulent and subtle chaos or Aether. A **Descartes** that postulates that the universe is full of swirls of invisible particles of a very fine substance; that their motion around the Sun drags the planets along and is responsible for transmission of the force of gravity. Yet, this **Descartes** was always barred by **Descartes** himself, by the dualism that relates Religion and Official Science, by the metaphysical and not yet scientific nature of 'the method', his method. The very world of *substance* is in **Descartes**' philosophy precluded from science, which is banned *to* the world of *accident*, and can never reach the 'real' or 'final causes'. This already leads **Spinoza** to criticize him for mistaking attributes for substances. Likewise, the development of algebra in **Descartes**' thought must be subordinate to geometry; and the vortical and turbulent aether is grounded in metaphysical thought and not in experiment or observation - and is thus devoid of any practical or scientific utility or advantage, as it could not even explain **Kepler**'s Laws.

The eruption of a third **Descartes** in **Descartes**, is a sort of unconscious manifestation of a stronger force in thought and cognition, a force pushing away dualism and idealism, pushing natural philosophy towards monism and eccentric science. Such intrusions riddle the fabric of thought and the history of culture, and are everywhere made manifest by currents of naturalism and empiricism in philosophy. They are the intrusions of eccentric science into metaphysical thought and Royal Science. They are a timeless refrain that repeats across the centuries of antiquity, through despotism and civilization, a vein that had already vexed the dominant priesthoods of Hellenic cultures and their representation of the world. Indeed, it is the eruption of eccentric science that stands behind **Anaxagoras**'s, **Protagoras**'s, or **Aristotle**'s flights from Athens - a refrain of flights - or leads to the prosecutions of **Theodorus** or **Diogenes** of Apollonia. It is a science, or a kind of science, that harkens back to **Anaxagoras** and beyond, into societies that are neither savage nor despotic or civilized - societies that function as loose aggregates of mining and metallurgical artisan leagues often working in conjunction with nomadic bands.

Gilles Deleuze and **Felix Guattari** ran into the absolute necessity of distinguishing between Royal Science and "a kind of science, or treatment of science, that seems very difficult to classify, whose history is even difficult to follow" [2]. Commenting on **Michel Serres**' work - on what he has called 'eccentric science' - they define the basic characteristics of *this other kind* of science. The main defining trait is, to our view, that the model of thought which it employs can be described as smooth, based on continua, one that does not striate either horizontally or vertically. Its object is not static - nor is it beings or their apparent and illusory constancy - but the constant transformation or alteration of beings, their becomings, the transitions and heterogeneities, the dynamics of processes. It aims, for this very reason, to become a science of Time - in fact its ambition is to become a Physics of Time.

A Physics of motion and the living. Perhaps also for this very reason, this eccentric or minor science has the *most distant* of its *recent* 'origins' in the thought of **Heraclitus of Ephesus** (ca 500BC). As **Friederich Nietzsche** put it:

"(...) **Heraclitus** altogether denied being. (...) Louder than **Anaximander**, **Heraclitus** proclaimed: "I see nothing other than becoming. Be not deceived. It is the fault of your myopia, not of the nature of things. (...) You use names for things as though they rigidly, persistently endured; yet even the stream into which you step a second time is not the one that you stepped into before" ". [3]

Subsequently, this science can trace its development in the Hellenic world to **Democritus of Abdera** (432-?BC) - atomism and vortical, curvilinear motion - and to **Anaxagoras of Clazomena** (ca 500BC) -theory of chaos and ordered turbulence, or *nous*. **Serres**, **Deleuze** and **Guattari** suggest that this eccentric science has an hydraulic model - the model of Archimedean science: fluids are no longer treated as solids, flow is seen as being turbulent, vortical, not parallel or laminar; the shortest path between two points can be geometrically treated as a straight line but defines the length of a curve; principles of buoyancy counteract the weight of a body, etc. Eccentric science could be defined by the proposition "from *turba* to *turbo*" - from the bands or packets of atoms or inert matter, to the vortices they populate while being ordered into jets.

Democritus is a peculiar example of eccentric science or proto-science - in that his doctrine of Atomism is a precursor to the science of chemistry, and his invocation of an interstitial vacuum or 'nothingness of being' between the swirls of atoms presages the physical theories of the XXth century regarding 'empty space'. His doctrine was a reaction against **Parmenides'** doctrine of being, of the unity of Being, of its static and its non-divisible nature. **Democritus** admits the plenitude of being, but makes it the property of the indivisible atom, thus dividing Being and beings into the very small, to recover in some form the One of **Parmenides** at an infinitesimally small scale. Atoms, the indivisible units, possess no qualitative differences, only quantitative and geometric ones. Bodies and just as well souls are composed of atoms, the atoms of the soul forming only a finer and more subtle matter than those of the body. **Democritus'** atom is therefore just a finely fragmented Parmenidean One, but in the process of this fragmentation **Democritus** introduces becoming and movement into Being. Yet movement in space (which will later lead, in the thought of **Epicurus**, to the problem of the *clinamen* or the smallest deviation) is seen as requiring an *empty space*, and thus non-Being ("no-thing") or nothingness is said to *exist* and have a statute comparable to that of Being ("some thing"). Atoms, their movement and empty space are alone said to be eternal.

Democritus presents us with an extraordinary anticipation - his thought presents elements of the dualism of an Official Science yet to come in the age of civilization (one and multiple are merely adjectives; there are no fundamental substances, only materials), anticipating its mysticism (the soul exists but it is a fine matter composed of particles; the vacuum exists and is occupied by matter), and just as well anticipating its mechanicism (it's all about collisions and mechanical motion of the indivisible particles or atoms of Matter; Matter *is* and so *is* the Vacuum). But he also presents elements of a science that is *not official*, an *eccentric* science - where all beings, bodies and souls are vortices of atoms, all motion is vortical, and at a small enough scale being acquires becoming or motion. Most

importantly, his thought possesses those critical traits which, with **Galileo**, will lead to the enunciation and practice of the scientific method - the skepticism of the senses, of truths based on common sense or on unquestioned sense-perception. But, much like in **Descartes'** *Discourse on Method*, there is in **Democritus** no skepticism of reason, which is taken to be the *only* source of legitimate or true knowledge.

So **Democritus** is ambivalent - yet, many (**Friederich Lange**, **Gordon Childe**, **Wilhelm Reich**, **Michel Serres**) have attributed to him the real epistemological break with Greek culture, with its Gods of superstition and its city-State, mythical representation of knowledge. **Reich** will go as far as to view "the energy hypothesis of the 'soul atoms' of **Democritus**" as the first development of Greek philosophy that leads to science and breaks away with superstition and fantasy, considering it a precursor of his own theory of orgone energy. **Democritus** definitely marks the birth of scientific materialism in Occidental thought, a development that would eventually lead to chemistry and particle physics. But his ambivalence, in hindsight, appears to be a mix of two different sciences, one at once mechanistic *and* spiritualizing (materialistic *and* metaphysical), and the other an eccentric, functional science. Yet his thought was not science in either sense.

Perhaps the *deeper, more enduring* and *eccentric* subversion of Parmenidean dogmatism was **Anaxagoras'** thought: he rejects concepts such as origins in Time of Being, the creation of Being from non-Being, the false transformation of nothing into something (we can already recognize here a basic criticism of what became the modern-day cosmological doctrine of the Big Bang), and ridicules the understanding of motion as 'change in motion'. **Anaxagoras** claims that everything originates *from everything*, and that the being of the universe is *eternal*. There are only transformations. He raises the fundamental question of an eccentric science or natural philosophy: where does motion come from, how does it 'work', how does it 'adhere' to objects or beings (in free fall, in wind sails, etc)? The motion that is perceived in the exteriority of things is only an illusion, an appearance, an interpretation by this or that sense, always projected onto a sense or other. The internal perception of motion is that of a motor, but here **Anaxagoras** commits the same mistake as **Democritus**: he remains trapped in the collision of substances of the same nature (material), in the collision of elements of matter, while claiming the infinite existence of substances (the same error that, in **Spinoza's** view, was made by **Descartes**) of a different nature. The young **Nietzsche** wrote a beautiful passage on this topic:

"To get past such argumentation, the opponents of the Eleatic unmoved unity were led astray by a prejudice originating in sensation. It seems so unarguable that every true existent is a space-occupying body, a clump of material, large or small, but in any case extended in space, so that two or more such clumps cannot occupy the same space. With such presuppositions **Anaxagoras**, and later **Democritus**, assumed that the clumps would have to collide if they should hit one another as they moved around, that they would contest for the same space, and that hence it is this strife between the clumps which causes all change. In other words those wholly isolated, totally different, and forever unchanging substances were, after all, not thought of as absolutely different, but rather they were felt to have a completely like substratum, a fragment of space-filling matter, in addition to their specific, wholly unique property. In their participation in matter they were all equal and alike and could therefore have an effect upon each other, i.e., collide. All change, in fact, depended not at all on the differences between substances but on their similarity in so far as they all partake of matter." [4]

Yet, **Anaxagoras** tries to salvage the situation with one of the most creative ruptures with Hellenic cul-

ture - the enunciation of a natural physical principle of order, that which makes things and beings intelligible. All substances are material, the substance of the soul or thought being “an extremely delicate and sensitive material”, a fine matter (*nous*) that interacts with all other substances of matter by mechanical means, “by means of pressures and impulses” (to borrow Nietzsche’s words). Which leads him to a new cosmology - the primal existence of the world only knows a chaos of material particles, a mixture, without order, of all substances. Given sufficient time, one substance, a finer substance, comes to preponderate over all others, comes to serve as *the principle of order of all other substances*. It is the work of this substance to order primal chaos, to permit *chaos* to become *cosmos*:

“This can only be the consequence of motion, but it must be a definite and a wisely instituted motion. Such a motion is the means employed by the *nous*.” [5]

Before *nous* comes to dominate, there is only inert matter, only the physicality of inertia. The *nous* is, however, a fine matter that acts on all other matter to animate it, to confer upon it a definite state of motion, one that orders the chaos into vortices, that confers to matter and beings an internal motor principle, that lightens and counteracts inertia. All happens as if there is inertial matter and noninertial ‘matter’, the latter alone being the principle of order and life. Inertial matter is a multitude of different substances, no different in material nature from the noninertial substance of thought, but the latter is single and unique, because it alone is able to order the former, that is, all other substances. We’re left wondering if ‘matter’, in the Anaxagorean acception of the term, is not simply a general qualification of ‘physicality’, of the physicality of flows or the physicality of energy, as if **Anaxagoras** were speaking about two types of *physicality* or ‘materiality’, rather than two types of Matter; as if he was acknowledging two types of energy, one inertial, and thus the source of all Matter, and the other massfree or non-inertial, but no less physical, no less objective or devoid of ‘*materiality*’ - when this term is understood to designate ‘objectivity’ of the existence of *something* to the senses, rather than referred to the concept of Matter. Without the *nous*, there is no order to inertial energy, no order to Matter. Matter is only ordered and moved in consistent ways by the *nous*, by the physicality of the substance that thinks, by the *thinking substance*, by energy free of mass or inertia. The *nous* is the principle of vortical motion - that which gathers, assembles, sediments and separates - and all worlds are sustained by it.

It is in the thought of **Anaxagoras** - of which all that remains are scant fragments - that the eccentric break with the representation of antiquity and with Parmenidean philosophy is most evident because he introduces a ‘superfine’ hydraulic model of the fluxes of Matter being guided by physical fluxes without inertia, turbulence becoming a principle of dynamic order and awareness, not a given in chaos. The *nous* becomes a presage of the concept and function of a dynamic, massfree Aether. **Anaxagoras** returns **Heraclitus** to his rightful place, while beings are allowed to *appear* to be static because their internal motion can be made consistent, can be ordered, it is being that is founded in becoming and second to it: all is in motion, and for a little while all is separate or has a separate existence by the constancy and the individuality of its motion.

But neither **Heraclitus**, **Anaxagoras** nor **Democritus** were the creators of eccentric science, nor even

of an effective model of a minor science. Nietzsche accurately reflects **Anaxagoras'** contribution when he argues that, following **Anaxagoras**, "becoming is not a moral but an aesthetic phenomenon" [6]. One can clearly see natural philosophy grasping here for its self-sufficient and independent foundation - that natural science can only be knowledge of becoming, of change, of states of motion. Yet, an ethical foundation (one that ethically rejects submission of knowledge to morality) does not suffice for the constitution of a science. **Anaxagoras** knew what path such a natural science had to take; **Anaxagoras** knew that his concept of the *nous* was "the outcome of his truly pure scientific method, the method which in all cases and above all else asks not to what end something arises (*causa finalis*) but how something arises (*causa efficiens*)" [7]. Not the molar function, but the molecular functioning, the formative act, the how - that is what mattered to science according to **Anaxagoras**; that's the aesthetic choice which is also ethical. Still, this was not enough to create a truly inductive-quantitative method, a formal (logical *and* mathematical) and experimental method.

Serres, **Deleuze** and **Guattari** are entirely correct in seeing the first defined model of eccentric science in Archimedean science. It is with **Archimedes** (287-212BC) that the principles of mechanics, hydraulics and light are first mathematically and experimentally extracted in a manner that can or should be qualified as scientific. In fact, long before **Francis Bacon** and **Galileo Galilei**, it is **Archimedes** who *enunciates and applies the scientific method*. He employs both deductive reasoning and inductive-quantitative approaches, forming them into a single method: combines mathematics and geometry with experiment to find new facts and make new deductions from them, and tests these against further observations. **Archimedes** creates a *forensic investigation of science* as a method for the production of science and its diversification into separate sciences, at the very moment of the formal genesis of science. And so he contributes to mathematics (he describes the quadrature of the parabola, determines the area of a segment of an ellipse or a hyperbola, creates and examines the properties of the Archimedean spiral foreshadowing 'integral calculus', discovers the principle of the addition of exponents), astronomy (he is perhaps the first to hold an heliocentric view) and optics (he invents lenses, mirrors, parabolic reflectors), mechanics (mechanism of the lever); invents a new hydraulics (the hydraulic principle for raising water, the Archimedean water screw) and treatments of gravity that consider the neutralization or counteraction of gravity (the buoyancy principle - or how the *weight* of a body immersed in a liquid is decreased by the *weight* of the displaced fluid). His mathematical and geometrical work still proceeds propositionally, by theorems, but these are far more *problems* than *theorems*: "the problem is not an 'obstacle: it is the surpassing of an obstacle, a projection, in other words, a war-machine" [8]. The model of eccentric science is *the problem*, ie the war-machine: "this conception of science is bound up in an essential way with the war-machine: the *problemata* are the war-machine. (...) It would seem that the war machine is projected into an abstract knowledge that is formally different from the royal or imperial sciences". For the *problemata* are the concrete problems of each war-machine, problems of transmission of work, energy and motion, and determination of impact (momenta). **Archimedes** applies all these new sciences or disciplines to the arts of war, to engineer technological advantages to defend his native city of Syracuse against the encircling and blockade by the Roman armies of Marcellus - inventing the compound pulley, cranes to drop large rocks, the catapult, and possibly a gigantic parabolic mirror capable of focusing the sun's rays on enemy boats.

It is this technological status that seems to relegate Archimedean science predominantly to the realm of engineering, rather than to that of science - as **Ilya Prigogine** and **Isabelle Stengers** remark:

“Archimedes’ status is merely that of an engineer; his mathematical analysis of the equilibrium of machines is not considered applicable to the world of nature, at least within the the framework of traditional physics” [9].

It is a status that **Deleuze** and **Guattari** denote as “the ambivalent figure of the military engineer”. Military because the war-machine may already be found at the service of a State - just as **Archimedes** served the designs of the Syracusan city-State, a military State; in other words, because the war-machine may already have become transformed into a military mechanism or be already issued from it, arise within it. The war-machine is from the beginning entangled with the State, but it is *an outside* entangled with *the inside* of a State, just as eccentric science is a foreigner entangled with State science. **Deleuze** and **Guattari** suggest that it is the very nature of State science, of Official Science, to appropriate and alter the elements of nomad science. It is in nomad science that State science searches for its new elements, nay more, searches for its paradigmatic changes. So eccentric science is also the preferred source of *problemata*, a goldmine of new data, methods and concepts for Official Science, a source to be constantly pilfered, adapted, altered, limited, striated, recuperated, co-opted.

Eccentric science was born with the war machine, with nomadism. But we only recognize its markers (eg **Archimedes**) where they are part of a war machine already captured and appropriated by a State, part of a military mechanism, no longer nomadic. Later, in the Renaissance, again we see its imprint: it is eccentric science that permits the autonomy of science towards religion, the autonomy of method that becomes doubled by, reduced to, and converted into, the formal separation of Official Science from religion. But with all that, eccentric science still gains no “droit de cité” - it remains a mere springboard for the New Official Science, while constituting its properly speaking ‘scientific repressed’. Unable to find for itself a place, either through a war machine that preserved the nomadic vector, or beyond the tentacles of the new State officialdom of Official Science, eccentric science is forced to become a war machine of its own, on its own. The underground of Official Science.

2. Spinozist monism and eccentric proto-science

Where, then, does the continuation of eccentric science - in the process of becoming a war machine on its own - pass after **Archimedes**? Certainly, there’s the systematic attempt of **Lucretius**, who returns to Atomism. And, as we have pointed out, there’s **Galileo**’s rupture, where the scientific method itself is an intrusion of eccentric science; and there is even a ‘third’ **Descartes**, one who proposes that the vortical motion of an Aether is a principle of continuity of action. Knowledge is certainly not science without becoming able to take into account the number, the properties of quantitative differences, the metric and geometric properties of the quantitative. But we would suggest that the next step in the continuation of eccentric science comes from what **Deleuze** called ‘expressionism’ in natural philosophy, the monisms of **Spinoza** and **Leibniz**. When both distance themselves from cartesianism, from a dualistic form of rationalism, they have in common a monist concept of knowl-

edge that is neither nominalist nor geometric. Paraphrasing **Deleuze**, the real or 'true knowledge' is a species or kind of expression, one that performs a dual transformation or superation: on one hand, the *representative content* of an idea is overcome by discovery of the *immanent content*, the *expressive content* of the idea, an uncovering of the intrinsic and absolute content of an adequate idea, its *innermost essence*; on the other hand, the formalization of the idea, the *form of the expression*, reaches a logical or 'explicative' mode. Science, or real knowledge, is about the production of adequate and self-consistent ideas, and since this is a gradual process, science must form *per force* an open system.

Baruch/Benedict Spinoza (1632-1677) demolishes the cartesian dualism. **Descartes**, in his dualist scheme, had proposed *three substances* - two finite, thinking and extended, soul and body, as the basis of dualism; and a third, an infinite thinking substance that *transcended* the other two, God. God was the only superation of the fundamental dualism of existence. **Spinoza** argues that substance is only that which has independent existence and self-causation, that there is only one such substance, that it is infinite and the very being that serves as cause to all that exists. He calls it God, but then proposes that it is one with Nature, and immanent to soul and body - for we can conceive of God modified in an infinite series of ways as a thinking substance immanent to a diversity and multitude of minds, or modified in an infinite series of ways as an extended substance embodied by a variety and multitude of bodies. The mind is only the idea, adequate or inadequate, of the body, just as the body is only the correlate extension of the mind. Body and mind are part of nature and part of God:

"Body is part of Nature. As regards the human Mind, I think it too is part of Nature: since I state that there exists in nature an infinite power of thought, which insofar as it is infinite, contains in itself objectively the whole of Nature, and its thoughts proceed in the same way as Nature, which, to be sure, is its correlate, its 'ideated' or 'conceived' (*ideatum*). Then I declare that the human mind is this same power, not insofar as it is infinite, and perceives the whole of Nature, but insofar as it is finite and perceives only the human Body, and in this way I declare that the human Mind is a part of a certain infinite intellect." [10]

It is evident that this monist-spinozist concept of substance is not a concept of a transcendence - as is the concept of God-substance in **Descartes** - but an immanent concept, one that ascribes a principle to the universe - not as a beginning, but as a permanent, efficient and sufficient cause. The focus of **Spinoza's** inquiry is to understand how this principle is the cause of all that exists and is natural. He is in search of the Aether ('what being'), which he calls God, and the aethereal causation of beings and their motion:

"As soon as is possible and rational, we should inquire whether there be any being (and if so, what being) that is the cause of all things, so that its essence, represented in thought as an objective essence, may be the cause of all our ideas, and then our mind will to the utmost possible extent reflect nature. For it will possess, objectively, nature's essence, order and union. Thus we can see that it is before all things necessary for us to deduce all our ideas from physical things - that is, from real entities proceeding, so far as may be, according to the series of causes, from one real entity to another real entity, never passing to universals and abstractions, either for the purpose of deducing some real entity from them, or deducing them from some real entity". [11]

Finding the innermost essences of things and beings was the object of true or *reflective* knowledge, as **Spinoza** called it. The more specialized and concrete an idea is, the more distinct and clear it

becomes, the closer it comes to the innermost essences of things and beings, and the more adequate our idea of these things and beings becomes.

Spinoza's practical philosophy of nature marks the moment when eccentric science tried to seize more than **Descartes'** ambivalence or even **Galileo's** pragmatic experimentalism permitted. It was perhaps a jump to the end of a 'luminous' book that had not yet even began being written, the book of an eccentric science that would growingly challenge any and every dogma of the New Official Science for centuries thereafter. Like **Galileo's**, **Spinoza's** philosophy still searches for light and transparencies. But it is also a proof that it is possible and necessary to experiment with logic, as possible and necessary as to experiment with observations, perceptions and numbers.

How is Spinoza pertinent to our taking up **Serres, Deleuze** and **Guattari's** argument for the existence of an eccentric science that insists beneath, aside and beyond every form of Official Science, religious, imperial or democratic? The eccentricity of science is tied to the problem of the importance of numbers with respect to ideal figures or proportion (metrics versus geometry), and the relation between numbers, ie qualities or *elements that cannot be divided without changing in nature*. When **Spinoza** speaks of the manifestation of space (extensivity) and bodies as an extended substance, as the extended substance of God, and attributes to it, in Part I of the "*Ethics*", the character of infinity, he is explicitly arguing against cartesianism - against the notion that since all extended substances can be measured by an external ruler, an infinite extension may still be measurable since it will be made up of finitely extended parts. **Spinoza** argues this is an absurdity, that the substance extended is no less infinite than the thinking substance is, and *no less indivisible in nature* either. He argues further that bodies can meld, interpenetrate and thus the concrete existence of an extensivity is subject to perpetual and indefinite variation (he anticipates a deeply aetherometric insight about the energetic nature of Space).

What **Spinoza** does not make clear is *how* extensivity is infinite: it is because of Time, of its infinity of flow, that infinity may be said to be fundamental to both existences of the single substance, in extension and in intensity, in space and matter *and* in the soul. Extensivity *persists* in Time, just as intensity *exists* in Time.

The problem of the function of quantity and quality (difference in kind) is compounded by still other problems. Space, extensivity, movement and relative rest are **Spinoza's** fundamental physical categories ("notions of what is common to all things") that define the extended mode of existence of the single substance. They form a set of qualities that permits measurement, finite counting and divisibility. It is only insofar as this measurement is external to a body that quantity is conceived abstractly as "finite, divisible, and composed of parts", that it remains an imaginary quantity; the moment that we consider quantity "as it exists in the intellect", or insofar as extensivity itself *is* substance [12], *quantity exists no longer as measurement but as measure*, as an *intrinsic property of a substance*, as an "infinite and indivisible" quantity (a singular quantity or measure). Put in other terms: neither Space nor Mind can exist other than by Time and in Time. And since Time is infinite, Space and Mind are also infinite modes of the indefinite existence of God or Aether in all beings and things. Put further in

still other terms: only the numbers that are external to a being or a thing, *qua* imaginary or arbitrary quantities, are finite and divisible; the numbers or the quantity that belong intrinsically to a thing or a being, as part of their cause or their essence, those numbers or that quantity are non-divisible.

We should note how this is an argument that anticipates the concept of energy and the properties of energy, in particular as the argument concerns the totality of energy *and* the concept of an energy unit (an atom or monad). A quantity of energy may be finite, made up of a finite number of units, identical or different in size and kind. Yet, the variation in the finite number of units may be infinite if all that can vary are the size and the number of the units. If a quantity of energy with a variable finite number of units is to be preserved indefinitely, then though that quantity may even be divisible into any number of units, it is simply not divisible *qua* quantity, total quantity, that is preserved. Furthermore, now consider each component unit. Though each unit may carry a finite quantity of energy, it is not divisible, *not without changing in nature or kind*. And indeed, an atom is not divisible, not without changing in nature, nor is an elementary charge divisible (unlike what is assumed by quark chromodynamics for massbound charges) or a quantum divisible; and when we destroy an elementary lepton, we obtain a photon or photons, not leptons. Each atom, elementary charge or quantum has a measure, an indivisible measure, an intrinsic number, a single or singular number, an infinitely single number that belongs to the essence of that physical object - as infinitely single as is the number of a total quantity of energy to be indefinitely preserved. To understand quantity as the property of a thing, we need to understand first the essence of the thing. **Spinoza's** view of the role of the quantitative in knowledge is to separate that which is referential or external measurement, from that which is measure and thus part of what he calls "the true codes of things, according to which all particular things take place and are arranged" [11].

To conceive of things and beings properly, adequately, in accordance to their nature, one had to first understand their ultimate essence, and then seek their internal essence or proximal causes, *the internal codes, measures and properties of things*. Then, the "second part of the method consists in obtaining the knowledge of the conditions of a good definition or an adequate idea, and the means to finding them". This is the essence of the scientific method, since, in reality - says **Spinoza** - "the knowledge of an effect is nothing other than the acquisition of a more perfect knowledge of its cause". Lastly, though not necessarily, he says, we may be able to relate and derive the properties of things and beings from adequate ideas, from the system of adequate ideas, ie from true science.

In one other insight - which prefigures **Reich** - **Spinoza** holds that what bars us from forming adequate ideas of things, beings and God, what bars us from science or actual knowledge, is our desire to suffer, to remain slaves of our passions, beginning with our shunning of joyful passions. Spinoza distinguishes between two types of affects (*affectus*): those that are a source of sadness (fear, anxiety, hope, repentance), passive sentiments that prevent the formation of adequate ideas and do not go beyond passion; and those active affects that are a source of joy, emotions that increase our power to act. Only the latter permit an accordance with reason, and the development of its powers.

Spinoza frames the problem of knowledge in the same fashion as he frames that of action. Reason is

a sense, the sense of joy that is inherent to *joyful passions*; but it is still inadequate as such, as subject even to joyful passions, for reason is also a power, a power to act in the form of understanding. The act of knowing and its adequacy depend upon the kind of affect, sad or joyful, but even more so, it depends upon an *active joy* - joy as an "affection" (*affectio*), a *becoming reasonable*. To think, to permit reason to construct an adequate knowledge of nature, one must learn to avoid those passions which are sad, but one must also go beyond the passions of joy, beyond its *passive* affections, to find its power of *active* affection. One must learn to find joy as an active mode of existence, joy as an action, not a passion; joy as a doing, not a pleasure; one must find gaiety as the condition for science, for a science of the light (celerity) instead of a science of the heavy; for an eccentric, and not a Royal Science. Knowledge is not knowledge, nor ethical, unless it is an active pursuit, a mode of life or existence, a reason that acts, a joy that acts or affects, and no longer just an affected or passive joy. As with the Stoics, Spinoza holds that *freedom is* only a life lived in accordance with reason, the active affection of joy. Science, then, becomes the rational mode of life, of intelligence.

Reich's entire discourse about Reason and irrationality, with all its dualistic errors ^[13], owes far more to Spinoza and Nietzsche than to Descartes, Friederich Hegel or Sigmund Freud. For Spinoza, as for Nietzsche and Reich, reason is just another sense, one that only through joy can come to fruition, and only does so when it is at last able to create, to discover, to invent - to invent joyful possibilities of living, to act intelligently upon nature and upon itself, upon its own cognition and intellection, to act "in accordance with reason" to the benefit of life and the living. "To every adequate idea there corresponds an object, and every body or object has a proper idea. When and if ideas or concepts are adequate to things, they become 'proper' ideas, the ideas of a scientific knowledge of nature." This is, *grosso modo*, the fundamental thesis that is basic to Spinozist philosophy, but also to the foundations of science, since the scientific method proposes a method to determine the adequacy of ideas, a method to generate empirical or experimental concepts and correct them, by ascertaining - mathematically, logically and conceptually - their realms of effective validity, and thus to enable the construction of a map of their articulations, the tissue or *fabrica* of science itself.

Hence, for Spinoza, science could not be reduced to merely obtaining experimental results, anymore than it should limit itself to accepting observation (or even repetition or verification) as sufficient proof of anything. Observation itself is not only subject to failure, insufficiency and interpretation, but must become an element of an active principle, part of a process of systematic inquiry. The scientific method is not merely a method for the production of new facts and observations, or for the technological extension of our senses and perception. It is a method to test and gather knowledge, factual knowledge, and the objective of the scientific procedure is to reach the construction of an open system of knowledge that permits us to understand nature and better act with it (what Spinoza did not elucidate, in this respect, is the variation of all the possible analyses that typically surround an observation).

Spinoza's philosophy had to pass through a critique of epistemology - to identify how the emotional, social and political conditions under which we think are not conducive to the production of ideas that are adequate to their objects. Something positive could be identified in the historical and cul-

tural course of inadequate ideas, but inadequate ideas would never be able to go beyond an articulation of the contents of an arbitrary representation, or be other than subject to passive emotions. For ideas to reach that movement of thought which is adequate to the movement of nature, they would need a method to reach *the expressive content of an idea*; not just its formal elements, but the articulation of its motion, its inner motion and variation, and thus its nature. Ideas could not be related as pure forms - there is correspondence between body and mind, there is even qualified parallelism, because the power to think and to know is proportional if not identical to the power to exist and to act.

It was not in the understanding of Science as *mathesis*, as mathematics, that **Spinoza** differed so much from **Newton** or from **Boyle** - that nature was written in mathematical letters, in numbers or number codes. But the letters, says **Spinoza**, are arbitrary, only the expression - in letters but independent of them *qua* specific letters - having the ability to permit ideas that reach adequacy. Accordingly, the numbers are written in nature but what matters are *the relations between numbers*, the *differences in kind* that articulate the numbers, the numbers that are measures, single and indivisible. **Spinoza** rejoins here the design of **Francis Bacon** in his *Novum Organum* - science is made up not of dispar experiments and fragmentary laws, but grows gradually as an open system of general laws, of relations that constitute specific articulations or functions that are intrinsic to processes, bodies and beings.

Spinoza's naturalist philosophy is not yet a functional science, an eccentric science. It is more like an assembly of epistemological conditions necessary to permit science to happen, conditions which were contributed by an ethical philosophy, a theory of education (as he puts it), "the whole science of medicine" and "the science of mechanics". The conditions he lays down force one to realize that science is more than its empirical method; that it is a system, that the number it seeks is measure, not measurement, and that without an understanding of quality, of differences in kind, of the essences of beings and things, it can never reach their properties or measures. **Spinoza's** thought constitutes the laying down of a proto-scientific project, the conditions for scientific investigation and thought. It is not yet science, though eccentric, and yet it is already beyond science, beyond the narrow view of science that is official, post-scientific - as if it were a fully formed eccentric science that had reached absolute knowledge.

There is an amusing episode involving the chemical investigations of **Spinoza**, which puts into evidence the epochal limitations of scientific knowledge that force it into various states of ambiguity, and how the inherent limitations to observation and the experimental method can only worsen the ambiguity. It is a reminder of the fallibility of claims to absolute or adequate knowledge. Niter, or Chile saltpeter, is potassium or sodium *nitrate* (KNO_3 or NaNO_3), a non-flammable substance. Spirit of niter or spirit of nitrous ether is essentially ethyl *nitrite* ($\text{C}_2\text{H}_5\text{NO}_2$), obtained by the reaction of potassium or sodium *nitrite* (KNO_2 or NaNO_2 , which slowly oxidize into nitrates) in an ethyl alcohol mixture of nitric and sulphuric acids, in the cold. The spirit of niter is a very volatile and flammable liquid that decomposes (under the action of air, light and humidity) by becoming acid upon release of oxides of nitrogen. **Robert Boyle** asserted that niter and its spirit were different compounds (heterogenous), whereas **Spinoza** argued that they were the same material substance (homogenous),

that the atoms of niter were at rest, but in the spirit of niter the same atoms were in motion. To test his hypothesis, **Spinoza** carried out several experiments; in one of them, he allowed sand to absorb the spirit of niter to demonstrate how in this restful or nonkinetic condition the substance was no longer flammable, and thus behaved *like niter did*. Likewise, with the proper mixture of soot and sulphur, niter can be made incendiary and explosive as part of black powder. Chemistry today gives **Boyle** reason, the spirit being a nitrite, and niter a nitrate, and thus they are *chemically different* compounds. But **Boyle's** argument as to flammability serving to distinguish the compounds, was plain insufficient. So was his objection that by introducing sand into the spirit of niter, **Spinoza** had added an extraneous factor. **Boyle** had to prove that this was the case, say, by showing that mixing the sodium nitrate with sand and applying pressure, eg a sudden shock, caused the addition of sand to have the opposite effect on niter that it did on its spirit, making niter explosive or flammable. Spinoza's argument is that the mere observation of a single difference is not sufficient to distinguish between substances and could signal, just as well, different properties - like different kinetic states or phase states of the same compound. In other words, **Boyle's** observation, by itself, did not suffice for concluding that niter and spirit of niter were different compounds. **Spinoza** was wrong about niter and spirit of niter, but right about the insufficiency of **Boyle's** demonstration.

3. Empiricism and functional thought

To be scientific, knowledge must *be certain* and have its *certainties adequately qualified*. Not certified by some authority, but *qualified* by the method itself of the scientific inquiry, which is what "adequately" operationally or practically means. This view is already the basis of the qualified skepticism professed by **David Hume** (1711-1776): skepticism of established knowledge, of an Official Science seconded by power, and *skepticism of reason itself for being uncertain and inconsistent*. Lack of this skepticism is perhaps the *deeper reason* why knowledge has so much trouble in becoming scientific, and why reason has so much trouble in becoming rational. Thought can be led to doubt the senses, but it seems mostly unable to doubt reason, its own reasoning processes, and so it is ill-prepared to understand what sense-perception actually conveys. Skepticism, above all, of knowledge (the 'truths' of sensation and perception) - this is perhaps the source of an eccentric science at the roots of the very events that eventually led to the formal separation of Official Science from Religion. But skepticism by itself is not a source of knowledge. Yet, skepticism of sense-perception, of reason and of the imagination, is certainly one of science's fundamental points of departure.

What was different and new about **Hume's** thought was not his notion that the only source of understanding was sense-experience (the intelligible comes from the sensible), or was empirical - or that 'imagination' was the source of reflexive capacity, and not a representation, not an imaginary of fantasy to which it had been reduced; what was different is that which, as **Deleuze** underlines, is the relationism common to all empiricism (eg **William James**, **Bertrand Russell**, **Jean Wahl**, etc): that *the relations are treated as being external to the terms*. A relation is always a state of tension between two ideas, and always external to them, at the middle, in an inbetween. Forcing thought to think relations in this manner is a process of experimentation that takes the relation as the real multiplicity - as the empirical function. **Hume's** arrangement does not put forth one more natural philosophy based

on the preeminence of being and its sensible vs intelligible terms, caught between sensations and ideas, or fantasies and superstitions. As **Deleuze** emphasized, **Hume's** insight is the realization that there are two types of experience and two types of ideas, an experience of the terms and an experience of the relations, an idea of the terms - sense-experience and intelligibility of thought - and an idea of their relation - in natural philosophy, in logic, in mathematics, in art.

Hume distinguishes two types of relations - (1) those that can vary without their ideas varying, and (2) those that vary when their ideas vary ^[14]. Relations of identity (logic), causality and spatiotemporal coordinatization belong to the *first type*, whereas relations of similarity, dissimilarity, proportionality of quantity or number, comparison of quality, belong to the *second type*. Distance and contiguity are spatial relations, relations that are constitutive of space and are established between distant or contiguous objects, but independently of them. They can vary without their idea varying. And they inflict their constraint upon our body and mind as an external power does. In the case of relations of the second type - those that vary when their idea varies - it is all about comparison: similarity or dissimilarity compare qualities; proportionality compares quantities; intensity compares combinations of one and the other ('degrees of quality').

Immanuel Kant reproached **Hume** for having turned mathematics into an analytical system of judgement, a comparative propositional system where the relationships of quantity and number were always comparative, always relative to the terms, to the properties of a quality and its associated number. Yet, the idea of an orange is indivisible and unquantifiable, and when one adds oranges the *arithmetic* itself depends upon the notion of adding at least two objects of a kind, each of which must fit the idea of an orange. Likewise, the distance between objects is a relation that only permits geometrization (the operations of *geometry*) when it is doubled up by a length that can be externally measured and thus made to serve as a ratio or measure for that distance. In fact, even for logic, **Hume** takes the identity $A=B$ as arising from the vicinity of the ideas of A and B , by their empirical association, and likewise for $B=C$; but the logical conclusion - the principle of equivalence of identities - given by the relation $A=C$ can be invoked as a relationship between faraway objects, a relationship of distance, only if the two separate similarities can be compared. The sign of identity, the equal sign, is not a property of being or an absolute of identity, but the property of a relation, a relation of distance (vicinity vs remoteness) that entails a comparison, a qualified equivalence that denotes similarity.

The real associationism of **Hume** is a conjunctive one - the logic of science is not the logic of being, some form of ontology, but the logic of a conjunction, a synthesis between terms, a synthesis between the terms (eg $A=B$, $B=C$) and the relation (eg $A=C$). And this is exactly what Aetherometry means by functional thought - that the synthesis operates not just between the terms, but between the terms and their varying relation (the relation that varies independently or not from the terms). **Hume** transforms the syllogism into a particularity of a more general function. That is what a microfunction consists of - a multiplicity that works, a variation that presents a continuum. The old despotic mysticism held that 'all is one'. But whether One was divisible or its Being all-encompassing, the multiple never ceased being but an adjective of Being - a 'One that was multiple', a paganistic One, a pan-Oneness

which constituted the essence of polytheism. Dualism breaks this pan-One into two, but that does not create a multiplicity, it does not create the thought of a conjunction or give any substance to the multiple. It is still the same logic of Being that rules in dualism. A multiplicity is never in the terms, in their number or totality - says **Deleuze**. And a multiplicity is not just in the inbetween of the terms, in their relation, in that which joins them. It is only when the multiple becomes substantive, when there is substance to all and to their differences - substance that inhabits each being, each thing, each process, each relation - that a multiplicity can be found, even when there are only two terms to be considered. A multiplicity lies not in the terms, or in their relation; it *operates*, it *functions* with both terms and relations. It is a function composing with terms and relations, their conjunction as an analytical synthesis.

4. The First Ambivalence: Proto-science or Pseudo-science?

Heraclitus, Anaxagoras, Democritus or Archimedes were not, however, the inventors of eccentric science. They mark perhaps its genesis anew - its refrain - in Occidental thought, the genesis of a thought that thinks nature in a dynamic way, that contributes a mode of cognition based not on theorems, but on problems and their experimental solution in both practical and analytical terms. It would appear that its roots are linked to a very different form of society that is neither savage, nor despotic or civilized: a form of society dedicated to war - specifically, to waging war on State-formations. This eccentric science, its invention, appears to date at least to pre-Mesolithic times, to the time of emergence of nomadic societies or war-machines. It is in all cases a kind of timeless science that is threatening to the State or already in the hands of a war machine. A science that developed by following mineral veins, by introducing the operations of separation and transformation (that, in a real sense, constitute the roots of alchemy), by vortical occupation of space, by the turbulent treatment of flows, by seeking speed and lightness rather than gravity, by the posing of problems rather than by the dictation (or by the 'axiomatic consistency') of theorems - is a science whose roots are much older than these Greek pre-Socratic philosophers of nature. And it is an eccentricity that repeats across the ages with all of its ambivalences, polarizations and enmities.

It is, in fact, eccentric science that manifests itself in **Copernicus**, and in **Galileo's** epistemological rupture - to operate the very shift in paradigm that separated science from religion in the age of civilization, but also eventually permitted a new Official Science to emerge. And, as already discussed, **Descartes'** minor theory of Aether vortices, aiming to explain gravitational action without recourse to action-at-a-distance, is another salient example of eccentric science, one that attempts to apply Archimedean principles of buoyancy to the motions of cosmic bodies. Then there is **Spinoza's** more profound break, a monist break that remains - like most eccentric science - peripheral to the evolution of the New Official Science. Here, too, there is a deviation towards a 'smooth science', a minor deviation from major Cartesianism, a recurrence of the 'other kind of science', an eccentricity.

So how does this vein of an eccentric science persist across the modern age? How has it remained a track parallel to, but divergent from, that of Official Science? Does it form a continuum of its own, does it reach thresholds of definition, does it gain a cumulative form or a model?

We would be tempted to answer these questions by saying that, yes, it persists across the epochs of civilization, in fact as a vein continuously mined to bring about the paradigmatic shifts of the ever Newer Official Science; yes, it is not just parallel to the latter, but its very repressed; yes, it forms its own continuum, as an integral science, as an inquiry into the properties of the Aether, of the general and the proximal causes of effects, of a better understanding of motion and changes in motion, etc; and yes, it gains a model, not gradually, but in fits and starts - it gains *models* that provide certainties, certain certainties, no absolute certainty but absolutely some certainties. It gains these various models functionally, and these models tend towards some form of integration in a functionalist thought - a thought of the innermost qualities and number codes of all that exists. But if we hold this, we should at least summarily demonstrate that while indeed it is eccentric or minor science which insists from within every major shift in Official Science, minor science is neither defined by these discoveries, nor by their recognition, nor still limited to them.

If it is reasonable to contend that the search for first principles or sufficient cause(s) is a search for the properties of the Aether, then this would sufficiently describe the continuum of thought that characterizes eccentric science. One may not include here, however, the theories of the luminiferous Aether, since the static or stationary Aether was the quintessential concept of Official Physics in the classical age of civilization. But theories of a dynamic Aether, theories that make kinematic considerations regarding turbulent flow, such as those of **Nikola Tesla**, **Alexandre Véronnet**, **Wilhelm Reich**, **Paul Dirac** or **Harold Aspden**, constitute a return of the eccentric vein or refrain of a minor science. **Louis de Broglie's** theory of Matter-Waves is another eccentric 'escapade' attempting to go beyond quantum-mechanics and uncovering a potentially smooth space of wave functions. We could even contend that **Albert Einstein's** search for a "dynamic gravitational Aether" (his terms), which preoccupied him for a while, was part of a vein of eccentricity that erupted just as General Relativity was becoming accepted. Its failure, in fact, was one of the factors which later plunged **Einstein** into a search far more characteristic of a Royal Science, the search for a Theory of Everything in the form of a unified field theory.

But if we characterize eccentric science by its intrusion into Royal Science, by its feats in 'engineering', by its "problematics" or sets of *problemata* in the quality of being a war-machine, then we should turn to that eccentric science that from the beginning has broken the ground for the great paradigmatic shifts. In this sense, **Rupert Hall** has suggested that the deeper scientific influence of **Archimedes** during the Renaissance is to be found in **Johannes Kepler** rather than in **Galileo**. The prejudices of the latter - despite his ingrained admiration for **Archimedes** - often led him to erroneous notions ('beliefs') not based on the scientific method he had pioneered, but on unquestioned *fiat*: thus he stuck to the perfectly circular nature of the planetarian orbitals, whereas **Kepler** extracted his three laws from a laborious mathematical treatment of observational data, coupled to the realization that application of the ellipse satisfied all the observed variations:

"By contrast [to Galileo's notions], the investigations of Kepler, who found strength to renounce the ancient prejudice, reveal the true Archimedean spirit." [15]

Yet, as **Hall** does not fail to remark, “if **Kepler** had not known the geometry of the ellipse from conics, he would have been forced to resort to combinations of circular and rectilinear motions like his predecessors” [16]. The correct answer was a combination - of the ‘laborious’ treatment of the data *and* the realization that a previously known analytical function could fit the treatment, a recognition of the intrinsic pattern of the data. If **Kepler** had not been prepared beforehand with knowledge of analytical geometry, he would not have realized that the figure of the ellipse could fit the data, and the data would have remained meaningless, an arbitrary and meaningless composite as it had been for his predecessors (an extenuating circumstance for **Galileo**’s case). This, we have argued, is the deeper meaning of serendipity: a discovery, or a paradigmatic change, does not lie *per se* in the collection of data, not in the observation *per se*. That is not the discovery. The discovery is what lies implicit in the data, the data’s potential if its pattern is recognized, realized, actualized, tested, verified, either as a previously known analytical function or by the enunciation of a new function. When real, discovery is an element of thought because it uncovers a relation in the process of proving its existence.

Robert Hooke, like **Kepler** at first, thought that the planetarian orbits would be more complex than an ellipse - an ellipsoid. But he could neither come to define it, nor demonstrate, as **Newton** did, that the elliptical model suffices for a dynamic account of **Kepler**’s First and Second Laws. **Newton** refused for years to provide such a demonstration to **Hooke**, the proof that an inverse-square force law yielded an elliptical orbit, even though it was his conflict with **Hooke** that had made him discover it - just as that conflict had pushed him to abandon university, the Royal Society and even science. **Newton**’s reproach in the outburst quoted at the opening of this chapter, presents, in fact, the two necessary components of science - that science requires, by its very nature, a relation between an hypothesis and a mathematical theory that explains the hypothesis; and that the second task of science is to confirm or invalidate this hypothesis by experiments and observations. Now, **Hooke** had performed neither of these tasks. For his part, **Newton**, almost nonchalantly, had brought about the convergence of two distinct series of proofs regarding force, centripetal and gravitational, with the result that, though the relationship was axiomatic, it alone could account for **Kepler**’s discovery, for the dynamics of the ellipse. Once again, this was a matter of eccentric science - and **Newton** could clearly see what **Hooke** was up to: to pilfer eccentric science for the sake of the New Official Science, by appropriating **Newton**’s own proof of **Kepler**’s Third Law. Here was a nomad **Newton** escaping the pincers of the Royal Society.

The question of science and which kind, when posed this way - with respect to the constant looting of eccentric science by Royal or Official Science and the intrusions of eccentric science into Official Science - assumes a very different aspect. On one hand, it makes perceptible the successive developments of distinct lines of inquiry that belong entirely to eccentric science; on the other hand, these lines may penetrate entirely into Official Science (yes, always with a time lag), even appearing to make indistinguishable which type of science they belong to; or, these lines may, instead, penetrate little or not at all into the framework of Official Science, remain eccentric and gain a consistency of their own, as if they formed a parallel track.

In the case of Astronomy, there is a penetration that is progressive and nearly complete; it appears to tell us the story of a single science. The science of Astronomy proceeds by positing axioms that, in being subject to the tests of observation, experimentation and repetition, can be successively corrected and revised to approach, in decrements of error, the natural occurrence, its intrinsic structure or pattern: thus, in this perspective, Euclidean space and Aristotelian naturalism would have approximated the truth of gross sense-perception, the Earth retaining its apparent central position, with the result being a static geocentrism with perfect circles; then, Euclidean space and Galilean-Copernican naturalism would have found a finer sense-perception, one that raised doubts as to the truth of gross sense-perception - hence the Earth loses its central position, and heliocentrism is born (or, in fact, reborn) while it retains the perfection of circular orbits; next, a first deviation occurs from that Euclidean space, as the new method of naturalism or science permits still finer perceptions - heliocentrism is retained, but the orbitals become ellipses; in the same breath, we move away from a theorematic science towards a science of solving concrete problems - such as how to account for the observational data which does not fit the perfectly circular model, how to generate an ellipse from the inverse-law. And in the process, **Newton** even discovers that the Sun, too, moves around a center in the plane of the ecliptic. Slowly the entire solar system becomes decentered, de-heliocentered. But then, the progression in the capacity of the description to acquire a greater accuracy stops. Once Royal Science was able to absorb all these eccentricities - with much reluctance, repression and arbitrariness - it stops. No other eccentricities may now penetrate into this domain - neither the motion of the solar system transversely to the plane of the ecliptic, intuited or discovered by **Giordano Bruno**, nor a real understanding of the galactic and supragalactic motions of the system, etc.

As one more instance of this asymmetric dynamics of eccentric and Royal sciences, an eccentric **Newton** is followed by a re-centered **Newton**, a royal **Newton**. Eccentric science gives way, yet again, to Royal Science. In fact, the mark of **Newton's** final victory over **Hooke** and others, is **Newton's** Presidency of the Royal Society that he retained until his death. It is now that the metaphysics fly high, beginning with the miraculous dogma of action-at-a-distance. Even as he demonstrated that cartesian vortices could not account for the planetary motions, a royal **Newton** failed to realize that the entire system forms a vortex moving transversely to the plane of the ecliptic, a gigantic vortex.

If a nomadic **Newton**, like **Spinoza**, worked against the framework of cartesianism, it was, once again by the return of eccentric science that another monist, **Leibniz**, would make that vein of science work against Newtonianism, against that which in **Newton** was not eccentric - that is, against royal astronomy. Reich commented on the subversive role of monists, on the eccentricity of their thought, their scientific thought and their thought on science: "We must admit that that the monists [**Spinoza**, **Leibniz**], in their thinking, came closer to the truth [of science] than the mechanists [**Newton**], vitalists [**Hans Driesch**] dualists [**Descartes**], and others." [17]. Swiftly and poignantly, **Leibniz** placed the problem facing an eccentric science of Mechanics and Gravity in **Newton's** conception of the universe and God (as **Spinoza** had placed it in **Descartes'** conceptions of nature and substance), which had meanwhile become the new currency of Official Science: either one was obliged to agree with **Newton** that, by his First Law, God was an imperfect workman who needed to tinker continually with his creation to set it right, constantly performing miracles to keep planets moving in their rightful orbits; or

one had to realize that all the motions were the result of *continual and synchronous impulses from a medium*, the product of a vortically ordered flow. Each planetary orbit was a layer of an aetherial vortex, so claimed **Leibniz** and **Jean Bernoulli**. But Royal science had stopped assimilating well before that, and thus this claim remained outside of it, as the eccentricity it always was.

Kepler's proof that the burning-mirror must be a paraboloid is another return of eccentric science, the return of an Archimedean investigation and of the problem of the sectioning of a cone - under experimental conditions: the burning-mirror can be physically achieved (the requirement that the rotating curve of the mirror surface fit an isosceles triangle was empirically known), but it was a mathematical analytical problem to discover the curve that would satisfy the physical requirement. Once more, **Kepler** demonstrated that there are two phases to scientific experimentation - the collection of observational data, and the experimentation with analytical methods (the same conclusion that **Newton** came to in his confrontation with **Hooke**). There could not be less experimentation on the level of theory and the analytical treatment of the data than there was at the level of the generation of the data, the practical experimentation with synthetic methods, or the production and collection of sense-empirical data.

So, in effect, there are two sciences, quite distinct in their model and methods, including their mathematical methodologies. But everywhere there is ambivalence - in the same scientist there now speaks a nomad, an eccentric, and next it is a man of State, an official, a priest who speaks. Everywhere the same ambivalence, the same *schizze*, the same oscillation of science between two methods, two kinds of science, two ways of relating to Space (extensivity) and Time. And everywhere the same process - first repression, then maybe rehabilitation, then fad - and the same classification: either it becomes swallowed by Official Science and is no longer eccentric, nor ever was (historical revisionism, if by nothing else then by loss of collective memory), or it can only fit in one of two other categories - *protoscience*, where eccentric science is ready to be captured by State science and receive official recognition, or *pseudo-science*, into which eccentric science becomes discarded in contempt. **Deleuze** and **Guattari** make a short list of such eccentric scientists and fields of investigation in ambivalent positions towards Official Science:

“Democritus, Menaechmus, Archimedes, Vauban, Desargues, Bernoulli, Monge, Carnot, Poncelet, Perronet, etc: in each case a monograph would be necessary to take into account the special situation of these savants whom State science used only after restraining or disciplining them(...)” [18].

An eccentric science recurs with the new atomism of **John Dalton** and with **Antoine de Lavoisier**, but chemistry only achieves recognition as an Official Science when it integrates with a theory of weight; until then it is still alchemy. The ‘Gothic hypothesis’ of ‘differential calculus’ (**Gottfried Leibniz** and **Isaac Newton**, once more) has only a “para-scientific status” before it is absorbed into Official Science. The same ambivalence and conversion of eccentric into Official Science is observed in the transformation of **Gaspard Monge** and **Jean-Victor Poncelet's** projective geometry into an analytical discipline; in the reduction of **Nikola Tesla's** work with the electric Aether and power transmission across distances to the classical Maxwellian-Hertzian theory of electromagnetism.

The ambivalence of scientists between the two sciences, Official and eccentric, Statal and nomadic, Major and minor, Institutional and alternative, is part and parcel of the dilemma raised by two ways of doing science: as a physics of routes and paths, versus a physics of waves and flows. Here we find the most fundamental of the differences between the two models of science. The former is, to the present day, taken from the physics of Official Science, from a physics that reproduces nature, that represents it with symbolical measures, and that is eventually satisfied with measuring the abstract probability of various approximations; whereas, the latter finds its model in a physics of continua, of their internal rhythms, of their intrinsic measures, of the wave properties of all particles, be they inertial or noninertial.

This ambivalence is, as **Deleuze** and **Guattari** pertinently indicate, also a political ambivalence, and a political problem, just as it is a problem of science; it is *the political problem intrinsic to science*. **Husserl's** work in protogeometry serves as another example, on which they comment that, here,

“we find a very accurate appreciation of the irreducibility of nomad science, but simultaneously the concern of a man of the State, or one who sides with the State, to maintain a legislative and constituent primacy for royal science. Whenever this primacy is taken for granted, nomad science is portrayed as a pre-scientific or para-scientific or subscientific agency.” [19]

When nomad science is absorbed by the State, when it becomes a part of Official Science, then it becomes a *protoscience* - atomism and alchemy as the ‘proto-sciences’ of chemistry, for example. But when nomad science is part of a war machine, when it stands aside and irrespective of any State, when it is pursued as eccentric, independent and self-sufficient, then it is classified *by* Official Science as a ‘*pseudoscience*’. It is now an enemy of the State, a science having all the attributes (pre-science, sub-science, para-science) of the simulation of science (note that all science is simulation, simulation of nature) but *lacking a representation* that could be socially sanctioned, that could be *recognized by institutional science*.

Official Science has therefore a dilatory relationship with eccentric, minor science. What eccentric science Official Science is unable or unwilling to import, it also cannot comprehend, throwing against that eccentric science all it has - from sheer ignorance or silence on the matter, to tantrums and anathemas worthy of the old Catholic Inquisition, to outright suppression and expropriation of the scientist's means to carry on research. Nowadays, the control by Official science over science itself can be exerted far more smoothly than ever, with the consensus engendered by technobureaucrats ensconced in peerdom systems and a media-based popularization of science that guarantees instant recognition and engineered mass-support and capitalization.

Official Science has a fundamental inability to understand what makes science eccentric - an incapacity to grasp the insights and processual treatments characteristic of eccentric science, and an incapacity to appreciate the systematic approach to science that characterizes the treatment of science that one calls eccentric. It always reduces nomad science to engineering, to technology, or explains away

its most critical findings. In essence, it refuses to recognize that -

“nomad science is not a simple technology or practice, but a scientific field in which the problem of these relations [between science and technology] is brought out and resolved in an entirely different way than from the point of view of royal science.” [19]

There is a resistance to studying the difference between the two different treatments of science; a resistance to learning a different treatment, to learning a practice of science that questions so-called established notions or dogmas and what appears to our senses. It is an organized resistance, socially and politically organized, but no less intrinsic to the fabric of Official Science. It is, at bottom, a resistance to admitting that there is a different way of treating problems, of posing problems, of doing science, a different approach to cognition, and a more adequate one at that. It is the resistance of a certain form of power, of its systems and mechanisms (science included), that were and are organized to prevent human beings from acquiring adequate ideas of nature, its processes and its beings. It's an irrational resistance that can be rationalized with religious or 'rationalist' justifications. It is the ultimate buttress of all stupidity. It is in this sense that one may well speak of a properly scientific armor against realizing what is the nature of Nature.

5. The second ambivalence: an incomplete *mathesis* of energy and treatment of Space

Perhaps the great source of ambivalence between the problems of an eccentric science and the theorems of Official Science, for all those philosophers and thinkers that got caught between the two sciences, the two kinds of science or two ways of doing science, is the relation of movement and substance (or energy, more adequately speaking) to the most fundamental properties of perception, the ontological properties of Space and Time.

This problem is already present in **Democritus**: if everywhere and in everything there are swirls of particles of matter, they must occupy something, that something being space; hence space must be empty, must be said to be and thought of as being empty, so that it can be occupied. Thus space acquires the physical statute of no-thing, not-Being or emptiness, and is that which alone is continuous (matter is fragmented into discontinuous atoms). Space can only serve to invoke a place, an empty place, a place that requires 'the empty', the vacuum. In "*Physics*", 208b, **Aristotle** defines emptiness, the vacuum, as that which gives existence to "place", to the concept of 'a place', as "the private space of a body". Space is a receptacle for matter, a form to be filled with matter.

Leucippus frames the problem that constituted the great dilemma of Greek philosophy in a manner that forecloses understanding of what Space is (what it consists of), just as it precludes an understanding of multiplicity and its unity - and thus, from our perspective, misses the nature of Aether as plenum. **Leucippus** says (following what **Bertrand Russell** wrote in his "*History of Occidental Philosophy*", chapter IX on *The Atomists*) that "the vacuum is non-Being", so "that which *is*, in the narrowest sense, must be an absolute plenum"; yet, "this plenum is not One, but an infinite multiple", because "from the true One no multiple could have come". The "true One" could not be the source

of the multiple because a perfect One could never be other than self-same identical and thus not subject to change or movement. What exists is multiple because it forms not a “true One” (a Parmenidean One) but a motion in a vacuum. Without the vacuum there is no space for that motion, no space for Matter to occupy and move through. Effectively, to expel from the philosophy of nature the metaphysics of the “true One”, **Leucippus** introduces the notion of a vacuum which can only be thought if we think its form as that of an empty abstract Space. The multiple is then that which exists *in* a vacuum, while the latter that which permits the assignment of place. Here one finds the beginning of what will be a lasting derangement for both the science of physics and the philosophy of nature.

This problem returns as a refrain - and a new divide separating **Descartes**, **Newton** and **Leibniz**.

Descartes, here too, introduced a principle of eccentric science only to cast a damnation over its functional(ist) utilization by invoking what became the basis of all materialisms, mechanical, dialectical and atomistic. **Descartes** argues that there is no action at a distance, that all action involves contiguity, proximity, continuity, and thus some form of transmission. But then, since in a dualist philosophy, Space or extension is merely the essence of Matter, it necessarily follows that Space is only ‘adjectival’, not substantive; it is Matter that is a substance, not Space. There can be no empty Space, says **Descartes** (thus differing from **Leucippus** on this), because Space is everywhere filled with Matter, coarse or fine be it.

Conversely, **Newton** proposes that a relative concept of motion can only describe an appearance, an objective appearance that can only be overcome if absolute motion may be determined in an absolute space. Relative motion is always the subject of an equivalence - as between saying that the Sun moves around the Earth or the Earth around the Sun. But “action-at-a-distance” requires an absolute space that conveys the action without any invocation of the contiguity of a plenum, or of its “true oneness”, or of a Space everywhere filled with Matter. Space, for **Newton**, is substantive, has a substantive being (the form of the vacuum) and serves as absolute reference for motion.

Leibniz instead holds that neither Matter nor Space are substances, nor is there any corporeal substance just “made up of extension and magnitude”, as he says in “*First Truths*”. He agrees with **Spinoza** in reproaching **Descartes** for having ill-defined Matter by the concept of extension, and states that “an infinite extension is merely imaginary”. But Time and Space - he says in his “*Inedit Refutation of Spinoza*” - are “the orders of things, not things themselves”. So, what does he mean by “order of things”? Which order is Space’s? The answer he gives has at least a dual aspect: that “extension is repetition of successive continua (“*extension est repetitio continua successiva*”), and that extension is always relative to “something which must extend or spread out”. Space for **Leibniz**, then, is the order of things in extension and relative to something that is extensible. Where, then, does this differ from **Descartes**? Did **Descartes** not conceive of extension as a seamless property of something, Matter (no matter how fine), that is extensible? This is where the commentators of **Leibniz** most frequently equivocate - and leave **Leibniz**’s answer flitting in the wind. The answer is simply that **Leibniz** refused both the Cartesian notion of a Space filled with Matter, and the Atomist notion of a

vacuum that permits the definition of an abstract Space. The ‘*something* that expands’ was not Matter, but a plenum that was extensible and of which Space was a property. The plenum was a continuum of “something extensible”, what made “spaces” continuous, what created Space. Space was neither absolute nor empty or infinite, and the vacuum did not exist. The question that remains, then, is what is the substance of this plenum. To this, article 47 of “*Monadology*” answers that “God alone is the simple substance, the primitive Monad, the primitive unity, or the simple originary substance, all the created or derived Monads being its productions”. The something that expands to create Space was God (or call it Aether), the simple substance which creates all the compound substances, all the derived monads, all the acting multiplicities (only God and the derived monads are substances, the One and its multiplicities, both substantive) and the system of their relations. Thus **Leibniz**’s concept of extension approaches **Spinoza**’s concept of extensivity as a property of God (see above).

Russell gives “the victory” in the three-way confrontation to **Leibniz** for having argued that Space was only a system of relations *in extensio*, and cites **Einstein**’s theory as the proof. But **Einstein**’s theory(-ies) either invokes contiguity of light fibers in empty space and appears to be cartesian (Special Relativity), or instead (General Relativity) invokes a physical property of Space (elastic deformation) or ‘Spacetime’ that permits gravitational transmission and requires no motion. Thus the General Theory rejoins **Newton**’s substantivalism, with the difference that the Einsteinian Space interacts with Matter. At the end of the day, the relations which **Einstein** chose are merely elastic, not energy or kinetic relations, or their product. A system of elastic and geometric relations requires neither Matter nor motion, nor energy.

So the question now becomes - just what kind of relations is Space composed of as a system? To say that it is “a system of divine relations”, that the relations are divine ones, is hardly an illuminating answer...

Leibniz could not be said to have “won” the contest; not yet and not really. For, if the relations which Space systematizes are effectively relationships of energy, then the concept of elastic deformation becomes nothing more than a metaphor for energy flux, energy order and conversion processes. Moreover, it suffices to read **Leibniz**’s contention in light of **Hume**’s theory of relations to immediately realize that Space is a property of energy, a form of energy relation distinct from the terms, from any two bodies of Matter; that energy is the substance of Space, just as it is the substance of Matter, and thus that Space - conceptually and perceptually - is at once the product of an energy relation and a systematic or inherent form of expression of the energy relation. But **Leibniz** did not have the concept of energy at his disposal (he actually enunciated it correctly for the energy of motion of a body, but called it ‘living force’); and the query as to what is the simple substance was not one that could be answered with metaphysics, or settled by pure nominalism (call it God *or* Aether). The energy nature of the relation was far from apparent, and Space might be “an order to things” and yet ‘those things’ hardly appear to be *something* other than Matter simply because of calls them “God” - unless things other than Matter are also considered to be as physical (not metaphysical) as Matter, and yet not-Matter.

The question of the nature of Space haunts the very language of the physicist - not just the spoken language (the semantics) that he uses, but the language of physical mathematics that he adopts. A treatment of physics that solely relied on the concept of force could never articulate Space as a general property of energy.

Reich's solution fares little better - as he must also take the ontological category of Space for granted, as being a given, but a given now *full* of energy ("*Nequaquam vacuum*"):

"It must be decided whether 'nature is an empty space with a few widely scattered specks [of Matter]' or whether it is 'a space full of cosmic primordial energy', a continuum that functions dynamically (...)" [20]

But it is not a question that can be decided with a simple decision, or *fiat*. Precisely, the problem of a definition and just conception of Space had failed to find the proper positioning which would permit one to make that choice or determination, ie would permit finding a good or adequate solution. Space can only be said to be full or empty for as long as it remains an abstract form, an ontological category in our minds. Then it must be filled or emptied with Matter, at will or need, instead of being grasped as a physical and general property of energy. To wit, observe how **Serres**, **Deleuze** and **Guattari** further miss this realization - Space for them remains an ontological category, and the only question that the differentiation between two distinct ways of doing and thinking science raises, concerns the relationship between flows and Space, between movement of Matter and Space:

"[The difference between an eccentric science and Official Science] is the difference between a *smooth* (vectorial, projective, or topological) space and a *striated* (metric) space: in the first case 'space is occupied without being counted,' and in the second case 'space is counted in order to be occupied' ". [21]

If one keeps solely to the notion of fundamental particles of Matter, wherein each particle cannot at the same time occupy the same space as any other particle (**Pauli's** exclusion principle), then all metric space is arbitrary, striated, defined solely by exteriority of material things with respect to one another, and by extension (not extensivity), and thus the contiguity of space itself (and with things immersed in it) requires that we must think space as being empty. If it is empty and the metric is arbitrary and striated, then smoothness can lie only in the action of these particles of Matter, in their vectorial motion and its projective characteristics. The crux of the matter is that this space is only an abstract space, a reconstructed, idealized space of understanding - a certain physical understanding, one dominated by topological relations; not one based on energy, but on a certain geometric description of the relations of place, or emplacement. It is as imaginary as the absolute Space of **Newton**. It is not the Space of energy, nor the Space that really serves as an order of things. It is not the Space where "things happen", or of "something that happens". It seems to us that topology should have to become more like morphogenesis, if it were to acquire dynamic properties and escape metric (or metricized) spaces. The plastic deformation of modern topological theories of space, viz Relativity, is no less subordinate to a metric - be it one of intervals, even unmeasurable ones; and this hardly suffices to satisfy the criteria of an eccentric science.

Can space be occupied without being counted when and if nature speaks a language of numbers and

their relations? This question can perhaps faster contribute to adequately posing the problem of an eccentric science and its specific treatment of Space.

The problem can be summarized in various ways - it is a problem of whether Space itself, as an abstract category or concept, has effectively any concrete existence in the form of an abstract space; it is also a problem of the measurement of Space and Time - to the extent that vectorial, projective or topological spaces are entirely subject - in their form and their measurement - to an external metric, an exo-reference, a ruler that is no less external and arbitrary if it is deformed or deformable. The problem is also inherent and analogous to **Descartes'** failure to find the general algebraic language of physics - since geometry results from the internal properties of bodies and the systems they compose, and a geometrized algebra can only approximate these internal properties *from without*, by recourse to an abstract extension, by employment of an external measure, by geometric representation. Some other form of algebra would be needed in order to speak with the intrinsic properties of things and processes.

But the problem has thereby become complex, as it is bound up with the logical and analytical treatment of multiplicities and the articulation of differences in quantity and quality. Vectorial, projective and topological spaces can be no less striated, no less metric, than static metric spaces. Space remains an unquestioned ontological reality, an unquestioned given, and this state of affairs is buttressed by the abstraction of Time from this space, and the factual exteriority of all elements of Matter. Even when space is said to be full, it is still treated as the same ontological and sensible given, still *unquestioned as an abstraction*, as if it were an apriori form of perception and understanding. **Deleuze** and **Guattari** sensed this problem when they spoke of an eccentric or minor science being one that develops rhythms, motion that is measured but by cadences, by internal or intrinsic measures, not by metric measures. The argument should not slip into semantics, not even musicological semantics. But cadences are endo-referenced or intrinsic measures that do not rectify fluctuations, they are an example of metrics without striation. Indeed, the question of metrics has been improperly understood - as if it eccentric were that which is uncertain or foggy, or unmetrical, and that which was metric had to be static and well-defined.

The problem is that this empty and abstract space so unquestioningly accepted by Official Science and by philosophy is not real, is not a physical space, is not a concrete reality or scientific concept. It is, rather, a royal metaphor of Space, a royal space - the royal space of all physics which has not succeeded in becoming a physics of energy. **Reich** came very near the resolution of the problem when he proposed that a dynamic Aether was massfree, ie composed of imponderable and non-inertial particles (the atomistic principle is transferred to a substance distinct from that of Matter, to become verily "monadological"). But **Reich** failed to take the next set of steps: since massfree energy is not subject to **Pauli's** principle of spatial exclusion, massfree energy units or particles may occupy the same abstract space at the same abstract instant of Time. Hence there is a continuum - not one of Matter (an impossibility, since Matter exists only in the form of external and weighty 'atoms'), nor one of Matter and empty space (back to **Democritus**), but one of massfree energy. The abstract space one speaks of is simply the sum of all the juxtaposed (in contiguity, and thus externality) and superim-

posed (in spatial coincidence) Spaces (or space-functions) of these massfree energy units, whether in and through the particles of Matter, or in and through what appears to our senses as an abstract space that *seems* empty. To get to this new plateau of expression and understanding, one (or **Reich**) would have to demonstrate how each energy unit (each monad) already constitutes a physical, concrete Space, a discrete Space, a discrete quantity of Space; how this is even true of the discrete mass-energy structure of all particles of Matter - that they too, each on its own, constitute(s) a Space, an inertial Space, and one that is limited by exteriority and contiguous (noncoincident) association. Finally, one would have to demonstrate and identify the functions that permit the melding and separation of those massfree-energy units that generates the appearance of an abstract space - and even more extraordinarily, the melding of massfree energy that permits the constitution of all particles of Matter itself. Space in abstract appears seamless because perfect contiguity and coincidence are properties of massfree energy, properties inherent to its Space-property. If there is a single continuum to nature, it is the continuum of massfree energy, of its contiguous and melded Spaces, of its universal synchronisms. The Aether, indeed, is neither inertial, as if at rest in a substantial Space, nor is it identifiable with any substantial Space. Concrete space is a volume, the volume of a fluid of massfree energy, with different densities of massfree energy existing in the same volume, with different degrees of energy superimposition, never constant, but always finite for every beat of universal Time.

This, we think, is the real crux of the problem of an eccentric science, the problem growing in definition across different epochs: the inability to relate Matter and Space adequately because of a lack of an adequate concept of energy, one that included an understanding of energy in its primary state, which is, after all, massfree, and an understanding that Space such as we perceive it (a complex of superimposed Spaces or Space-functions) is itself a product of energy. A resolution of this critical problem requires that one would come to realize that energy could be so subtle as to not be Matter, while being neither anti-Matter, nor non-Being. So subtle as to be the source of all motion of Matter, even the internal source of the energy of Matter itself, Matter being nothing but that melding of massfree energy that generates *inertia* (it is in this sense that massfree energy is the *virtuality* of Matter, so **Anaxagoras'** cosmology is incorrect, and still a mere artifice for distinguishing chaos from cosmos).

To bring eccentric science to the realization of an adequate emplacement of the problem is no mean feat - one is indeed constrained to identify that language of nature that employs self-referenced number relations, that employs metric relationships which are endo-referenced for each body in each relation or interaction, those singular numbers that are intrinsic to events. It is not because it is metric that science is Official or Royal. It is because Official Science only recognizes metrics based on external arbitrary measures, not the metrics intrinsic to a structure or a process. Vectorial, projective or topological spaces can be no less striated than metric spaces - it all depends on the rectifications, the corrections, the normalizations imported to generate a metric, even if it be a plastic or deformable one. But none of these spaces are the Spaces of energy, or a Space function of energy. Which, in a way, brings us back to the problem of **Hume**: the relation must be thought as distinct, independent and external to the terms; but there is also more to 'the relation': space between the terms, between the bodies, must be thought as a relation between the terms or elements, external to them and the source of a sensory datum; but this space is only as thought seizes it in the abstract, so as to permit

one to speak of a “perception of space” which already subtends the abstract concept. The sensory datum is first fabricated by that abstract notion, the order of things, the relationship between things in extension. The moment, however, one speaks of the extensivity of things, of the way Matter partakes of Space (and if it didn't, nothing should prevent two elements of Matter from occupying the same abstract space at the same time), one is no longer talking about a relation external to things but about Space as it is intrinsic to things, thus raising the problem of what else Space is intrinsic to. For ‘things’ does not exhaust the complement of all possible elements of a relation; not all terms or elements are ‘things’. In other words, one is now referring to a relation which is intrinsic to things, constitutive of things, and intrinsic to ‘elements’ or terms other than things, constitutive of them. Hence, there are relations that are external to the terms and there are relations that are constitutive of the terms, intrinsic to them, such that a term is already a relation between other terms, and a relation a term to other relations, an element of other relations. This is what **Hume** missed. And this is what must be thought through without falling prey to dialectics (since terms are not things, not objects). The Space which is a relation intrinsic to energy is an energy function, the very function that makes possible the organization of our senses, what permits to conclude to the existence of an abstract space shared by all things, and on which distances can be measured. It is not space that is full of energy, it is energy which is full of Space and thus permits the phenomenon of our abstract perception of space and the volume of things.

6. The third ambivalence - a physics or a metaphysics of Time?

A still deeper characteristic of eccentric science is its constant reach to become a physics of Time. This, too, ties in intimately to its Aether problem, to its search for a dynamic Aether, as well as its own existence as a war machine, as a non-Statal model of science or an alternative model of science.

When **Hans Reichenbach** talked about this subject [22], he was already posing, even if inadequately, the problem of a ‘beyond Relativity’ - a line of thought that would go beyond Relativity's fragmentation and reduction of Time, a line that was eccentric. Against the causal theory of time, **Reichenbach** levelled the argument that one cannot establish a causal priority or causal relation without already knowing, or having defined, an order to Time, time priorities or even some form of spatiotemporal relations. He proposes that a theory of Time has two fundamental notions that we must distinguish: the order of time and the direction of time. The first is a matter of causality, and the second, well, either a matter of entropy (following **Ludwig Boltzmann's** proposal that the direction of Time is only specified by energetically or thermodynamically irreversible processes), or a matter of arbitrary choice between equivalent “coordinative definitions”. But to argue, as **Reichenbach** tried to, that the direction in time physically depends on entropy increasing or decreasing, and that simultaneity is a matter of coordinative definition, may not really be what is needed for the ‘efflorescence’ of an eccentric theory of Time.

Let's take the question of simultaneity first. We have no problem with Special Relativity's contention that only local coincidence or noncoincidence of events can in principle be observed. And if all energy is considered to be electromagnetic, and its velocity of propagation is finite and fixed, then one

would also have no problem with asserting, as **Reichenbach** did, that the relativity of simultaneity *is independent* from the relativity of motion, from the relativity of observers - it is just *not independent* from the velocity of causal propagation. So, **Reichenbach** admits that it is indeed possible to construct a consistent theory of an absolute simultaneity - even if he thinks this to be wrong - but it is only possible because he takes the order of Time to be specified by the entropy vector.

The reader may already discern where we are going with this - in a direction very much put into evidence by the excellent texts of **Lawrence Sklar**: that, with respect to causation, science should rather adopt a spatiotemporal theory of cause, one closer to the premises of **Hume**, and one which, at the very least, understands that “epistemically, establishing the existence of the spatiotemporal relations is antecedent to establishing the existence of even actual causal relations” [23]. But, in summary fashion, we shall go substantially beyond what Sklar considered. We shall take his fear of “overstringent constraints” to the maximum, because we shall propose that this antecedence of the spatiotemporal relation, as well as the foundation for a spatiotemporal continuum, are properties of energy, the energy properties of that continuum, the intrinsic relation of the continuum. The direction in Time has nothing to do with reversible or irreversible processes, anymore than it has to do with choices of coordinative definitions for simultaneity, or with mistakes as to their interchangeability, or the false relativity (relationism) of observers that has now become fashionable. The direction in Time also has nothing to do with whether velocities are relative or absolute, as if this meant finite or infinite according to the magnitude of speed being involved. The direction *of* Time is the product of the motion of energy, a consequence of the fact that energy is *the substance of motion* and a substance *in* motion. Time has direction because all motion (and all transmission) takes time, finite time. Since energy is neither created nor destroyed (it is the un-created), only converted or transferred, motion must be perpetual - and thus the flux of Time must be eternal. That it takes time to propagate any signal, electromagnetic or not, is a consequence of the fact that propagation is a motion and that all motion takes time. This propagation does not need to have a limit, or a constant value, for motion to take time. As long as it has a finite speed - rather than being instantaneous or its speed infinite (which are metaphysical postulates) - it takes time.

Now, is this time that ‘is taken’ always the same time, a universal Time, a single Time? That is where the question of simultaneity comes in. For, locally, what is simultaneity? Locally, it has to be thought of as the coincidence of two distinct events or fluxes. The most basic coincidence is that which keeps a particle solidary with its wave - we should say with its waves, intrinsic and extrinsic. This most basic coincidence is a relation intrinsic to energy. That is the coincidence which in Aetherometry is denoted as the simultaneity of *primary superimposition*, one that is in fact immanent to the concept of energy and intrinsic to every energy unit, whatever its physical type: a unit of energy is always composed by *a particle and a phase wave*, and by the conjunction of a *group wave* intrinsic to the particle with that *phase wave* that is called extrinsic (aka the field wave). That conjunction is a synchronism, an internal resonance to the event ‘energy’, a simultaneity denoted by synchronicity; it defines an energy unit as a self-consistent wave resonance, as a resonant synchronism of waves. That is the *most local* of simultaneities, one defined *for two waves or two wave functions*. The generalization of simultaneity from the most local to neighbouring and then distant spatiotemporal relations is the next level of the

problem. Here, too, one must point out how, in the case of massfree energy, energy units synchronize by proximity and melding. Proximal synchronism of a plurality of units is in fact the basis for the phenomenology of the field concept; the arrangement of energy units into “pulsating” lattices is a consequence of resonant contiguity and, again, part of the field concept; and the melding of units, within the same abstract or topological space, what we have termed *secondary superimposition*. The *local* to *distant* relation, then, is embedded in the structure of energy and part of the same continuum of motion, or the ordered flow of energy. But one must equally point out that the proximal to distant relationship is subject to the finite time of motion, and thus that every synchronism, every energy resonance - primary, by contiguity or by melding - already presupposes a sequencing, a diachronism, an event repetition (the “infinite” has bearing only on this repetition), precisely what makes viable the identification of motion or the propagation of an effect. Simultaneity across distance results from resonant contiguity and resonant melding, and it is that which directly calls forth the direction of Time as being that of an irreversible, diachronic, sequential order of simultaneities, local and distant, involved in the synchronism of motion and the diachronicity of displacement and propagation.

Causal order, therefore, is always order *in* Time. It should not be confused with the order *of* Time, which is its physical direction. No causal order can therefore be ordered in Time so as to run contrary to the direction of Time, to the order of Time. It is here that the real distinction between a metaphysics of Time and a physics of Time takes place. A metaphysics of Time is always a possible scientific error. The plainest examples are the mainstream or accepted conventions of Newtonian action-at-a-distance in classical Official Science, and the action-at-a-distance model of electromagnetism and causation backward in time that characterizes the neo-relativistic thoughts of **John Wheeler**, **Richard Feynman**, and current Official Science. **Sklar** might argue that one should consider these concepts as scientific, but the simple scientific fact is that these are numerological and metaphysical concepts of Time, of a spatialized Time whose order is arbitrarily postulated to obey any order of causation that is supposed possible. **Sklar** himself has to admit to the implausibility of the causal theory of time: *it is not the temporal that should be defined by the causal, but the causal whose existence is only made possible because of the temporal*, because of that which modern science has so much trouble in admitting, and makes so many efforts to ignore: the properties of Time - the microphysical reality of simultaneity, the contiguity of energy flux in propagation or motion (the real relativity of simultaneity as a function of a finite time for propagation of stimuli), the irreversible course of diachronicity, the eternity or infinite duration of Time. All the absolutes that were never adequately distinguished, and then were instead imagined to be mere consequences of states of motion, or of a geometric/topological order to states of motion. If there is simultaneity, locally or at a distance, then simultaneous events are such irrespective of observers and their states of motion. And **Sklar** certainly did a stupendous job of pointing out the inconsistencies of the “axiomatizations” of Special Relativity in this respect.

However, as is obvious from a (micro-)functionalist perspective, the problem posed by an adequate understanding of Time qua multiplicity on its own right is still, in essence, the same problem that confronts any understanding of extensivity, Space and quantity, because both problems, that of Space (or extensivity) and that of Time (or Simultaneity and Succession), are the indissociable problems of

a scientific theory of energy. Time, too, when thought as Universal, is a relation external to bodies which, at the same time, is also a relation constitutive of those bodies, constitutive of the entire energy set of those bodies, constitutive of other elements, and thus intrinsic to energy. A thought of Time - logical, ontological and even biological - obviously exists in eccentric thinkers such as **Spinoza** or **Bergson**, outside of science, or aside from it. **Nietzsche** was perhaps the first to think in terms of a physics of Time. Coherent biological or logical expressions, or concepts, of Time as Duration, finite and infinite, have been possible without recourse to any effective physics of Time. But this does not mean that these concepts may be consistent with that physics. As it happens with **Bergson's** approach, his thought of Time is precisely inconsistent with a physics of Time that treats the latter as a function of energy. In fact, paradoxically as it may seem, **Bergson** agrees with **Einstein**, when **Bergson** consigned Time to the realm of metaphysics and psychology, both as simultaneity and as succession of instants, and left to **Einstein** everything else that could be spatialized, quantitated, measured, including the fictional time of Relativity - a spatialized Time.

What has for so long blocked physics from becoming a physics of Time? Certainly, Relativity is a major obstacle on the way. But is it Relativity, or even Machian 'relationism', that are the real obstacle?

It appears that the problem lies deeper; it lies where **Deleuze** actually thought it lay, but for the wrong reasons - as we will now see: it lies in the distinction between manifolds, or 'multiplicities', for which a concept of manifold or 'multiplicity' is necessary. The concept of multiplicities that **Deleuze** proposed, however, is not sufficient either for a theory of Time, a theory of Space, or for a physics of energy; in fact, it is only sufficient for metaphysics. Indeed, **Deleuze** does not so much overcome **Riemann's** concept of a manifold or 'multiplicity' as he adds to it, adds on the side the concept of qualitative multiplicities which cannot be counted, and which encompass both Time as Duration (*Chronos*), and Time as eternity (*sub specie aeternitatis*), or *Aeon*. Time would stand outside of any possible grasp by science, and thus there would be no real physics of Time, only physics of spatialized times - of times spatialized by a variety of possible metrics, of times already implicated in the workings of actual or quantitative multiplicities ("spatiotemporal states of affairs").

The deleuzian concept of two Times (one single and the other plural), of the dual nature of Time, is based on **Bergson's** theory of the relationship between the present and the past - of the co-existence of a chronological Time based on the diachronic succession of presents, and an immanent single, undivided Time that insists with the depth of the past on every present. **Pascal Chabot** ^[24] speaks of a Duration that is dual headed, of an experience of Time that comports two 'temporal jets', an actual jet, "psychological and successive", and a virtual jet, "ontological and simultaneous", as if the experience of Time in any present was composed by an actual present and a virtual past, the latter unceasingly drawing on the former, in the form of the experience of a present that does not cease to pass, that is already past ^[25]. All would happen as if the manifold of Time contained both actual and virtual multiplicities - something verily inconsistent that jumps to the eye when one contrasts it with the manner in which **Deleuze** interpreted the manifold of Time (in **Bergson's** theory) as a virtual multiplicity composed by the simultaneity of two fluxes (or jets of Time) with respect to a third - the dura-

tion *internal to something* that *lives* and *may* observe or *correlate* events [26]. The flux of Time implied for Bergson a triplicity of fluxes, not a duality. It is only with reference to the concept of simultaneity of temporal fluxes, that **Bergson** concludes to the existence of a single, universal Time for all separate fluxes of Time - a flux that cannot be divided, a flux that permits co-relation of events. Time could only be divided into separate fluxes - that differ in nature - *as and when* the virtual multiplicity of Time became embodied in actual spatiotemporal events or simultaneities. Thus, for **Bergson**, Time is only a virtual multiplicity qua single, universal Time *internal* to all experiences of Duration, there only being times (or separate timelines) when Time is seized by manifolds (or unfolded in the form of *a manifold*). It was simultaneity that was double-headed - a simultaneity of all times in one Time, in a single, virtual, infinite and universal Time, and the simultaneity of any two or more timelines in any present, each separate timeline or duration then having its own rhythm of passage.

Chabot also re-examined [27] the relationship between types of multiplicities in the thought of **Deleuze** and **Guattari**. Beginning by distinguishing a multiplicity from a set or ensemble (a collection of elements having a common property [28]), by conceptualizing a multiplicity as a collection of elements that have *intrinsic connections*, **Chabot** describes the two types of multiplicities in the “deleuzo-guattarian” system: actual multiplicities that can be divided without changing in nature, and virtual multiplicities that cannot be divided without changing in nature. In fact, what **Chabot** means to say is that the distinction is between actual multiplicities that can be divided without their *intrinsic connections* changing in nature, and virtual multiplicities that change in nature when their *intrinsic connections* are divided. **Chabot** gives as example of an actual multiplicity the number 10, as it may be divided in any two parts that can recompose it (2×5 being the example that he gives). All numerical magnitudes (“grandeurs”) or differences in degree of the same nature formed actual multiplicities. Conversely, virtual multiplicities are wholes that do not contain parts that are divisible elements [27]. As an example **Chabot** states that “one must not say that 20° [of temperature] contains 10° as if 10° were half of 20° ; rather one should say that 20° envelops 10° ” [27]. Another example that he gives of a virtual multiplicity are the relationships of speed, a given speed not being the sum of two smaller ones. Indeed, in “*One Thousand Plateaus*”, **Deleuze** and **Guattari** indicate that the two multiplicities stand for two different kinds of numbers - (1) numbers that measure magnitudes in order to striate space (numbers that permit counting), and are divisible without changing their unit of measurement [29], and numbers that change in nature and in their unit of measurement (they are “differentiated”) each time they are divided [30]. We should note how far this presentation has already moved away from **Bergson**’s distinction between different types of multiplicities, where only actual multiplicities were able to comport quantitative relations.

Chabot unnecessarily complicates matters by saying that numbers may either take recourse to a scale or divide by differentiation. Yet, while certainly temperature and speed are differential numbers, they may not be said to be numbers without scale, or even without *a* scale. The asymptotic behavior of the speed of any particle of Matter at near-luminal speeds is shown by our work on Aetherometry to be a superimposed energy effect (involving the superimposition of the self-energy of mass with the field energy of the accelerating field) that protects the atomic and molecular integrity of Matter - precisely by limiting the absorption of field energy that becomes the kinetic energy of the particle of

Matter ^[31]. The entire asymptote - including the (near)proportional part of the curve - is the result of the superimposition of two different physical processes with their *own* scales, one linear (for conversion of field energy into kinetic energy) and the other exponential (for massfree field energy in both electrical and thermal forms). We've equally shown how the 1938 Ives and Stilwell experiment ^[32] can be more exactly analyzed than is still possible today with the tools of Special Relativity, by employing a consistent theory of the superimposition of waves to explain the observed Doppler shifts and their differential elements.

Going further into the heart of the matter - into the core of the problem facing a science of energy - we must say that the contrast between dimensionless numbers in sums, products or additions with the same nondimensional unit of measurement (eg 10 of the same things), and numbers with a qualified physical dimensionality - such as temperature and speed -, ie *physical numbers*, is not reducible to the criterion that distinguishes multiplicities according to whether or not their division implies a change in nature in the intrinsic connections of their elements or terms. Superimposed energy or waves (or speeds), for instance, can be divided or separated into energy units or wavefunctions (*wavespeeds*), respectively, without the dimensionality of the resulting, separate parts having to change in nature (certainly not when the entire process is taken into account): the superimposition of two waves results on a third wave (or on the superimposition of two third waves, to illustrate how the overall physical dimensionality does not change), just as the superimposition of distinct energy units results in phase energy. Without in any way being an arithmetic addition, phase energy is a certain way of summing up energy.

We have also demonstrated in our work on Aetherometry that temperature has the physical dimensionality of length, and that, in the so-called absolute scale (the scale of temperature in degrees Kelvin), it simply indexes multiples of the volumetric density of sensible heat in its kinetic and electromagnetic forms. Under STP conditions, the unit is provided by Boltzmann's constant ^[33]. In a precise way (that of the superimposition of energy) and using the so-called scale of absolute temperature, 20° is a *certain sum* of 10°, of the addition into *the same volume of space* of two energy densities that, *at the same pressure*, each has the density corresponding to 10°. So 20° *may or may not* be divisible into 2*10°, according, after all, to the scale one employs, provided the treatment of temperature is energy-based (ie provided temperature is treated as an index of energy density).

If the entirety of the arguments and disagreements that we presented in the foregoing can be reduced to the problem raised by *possible* distributions of numbers, then the difference is between numbers distributed by addition, subtraction, division and multiplication - whether they are physical numbers or are not treated as such - and numbers distributed by superimposition that appear to divide differentially. Now, from an aetherometric perspective, the amusing part of the foregoing is that the different manifolds that Space and Time each compose on their own, are not differential manifolds (or manifolds in a relationship of differential calculus), but superimposed manifolds, each having homogeneous physical dimensionalities also found in a relationship of superimposition. These relations simply reflect the fact that Space and Time are merely the *indissociable and commensurate* manifold properties of energy.

One of the most fundamental differences of Aetherometry towards the natural philosophy of Deleuze and Guattari concerns precisely the treatment of multiplicities and its relation with the treatment of the manifolds of Space and Time ^[34]. Remarkably, it is also a difference, and just as fundamental, that Aetherometry has towards Relativity Theory (and not just Einstein's): the misunderstanding of the difference between the manifolds of Space and Time, and the lopsided conceptualization of what are multiplicities.

The problem of manifolds is all the more vexing as the concept of multiplicity is applied to each of them. If we go back to **Leibniz**, whom **Deleuze** claims to follow in this respect, multiplicity is a concept that applies as much to the Primitive Monad (God) as to the derived monads, as a multiplicity of derived substances and a substance-multiplicity; only the multiplicity is substance, said only when the multiple is substantive. A monad is a singular multiplicity. Now, in this very sense, Space is neither a multiplicity, nor a substance. To hold that it is a substance is, in a way, tantamount to thinking of it the way **Descartes** did - as if *extension* defined the essence of the corporeal substance, as if space needed Matter in order to be defined as a substance. Furthermore, space is not treated by **Descartes** as if it were a multiplicity. It is true that **Spinoza** treated *extensivity* as if it were an intrinsic property of bodies; he speaks of their "extended substance" - but then what he means is that one of the modes of existence of substance is extensivity; he is not saying that Matter *alone has* substance or *is* substance, nor that extension or space is a substance, nor still that it is a substance because of Matter, no matter how hyperfine - but that it is in the nature of substance (so, now, read 'energy') to have extensivity. So, neither abstract space as extension nor the extension of Matter constitute the extensivity that is intrinsic to substance. Nor - to put the nail in the coffin of dualism - is space a type of multiplicity, a multiplicity; it is neither a multiplicity when it is an abstract space - which is only a way of mapping things; nor is it a multiplicity when it is Space, a concrete energy function. Space constitutes a manifold because it is an attribute of energy. Space and Time are properties or qualities of energy, are manifolds that synthesize a relation *intrinsic* to energy - a relation, a commensurability, at once qualitative *and* quantitative. They are not multiplicities or types of multiplicity - they are the extensive and intensive properties of energy, its fundamental *modes of existence*: energy in all of its manifestations exists in Space and in Time, insists with Space and with Time. It is energy which is extended, or better, extensible substance, volumetric substance, just as it is substance that occurs and repeats, temporal substance. The extensions of an abstract space are a relation external to bodies, locations, states of motion or energy fluxes; not so the extensivity and the volumetric relationships that constitute bodies, their states of motion or any and all energy fluxes. Energy alone is substance - one as concept, multiple in form, expressed by change and the essence of all substances, of all acting existents, of all monads, of all multiplicities; thus energy alone is the multiplicity. Thus energy alone has substance. Space and Time are not substances or multiplicities - they are the manifolds of energy, they are some of the elements intrinsic to energy as a relation, a relation of production or superimposition. Space and Time are at once energy functions and the products of energy, of its flux.

It is in this context that the difference between Aetherometry and **Deleuze's** thought is at its sharpest

and most irreducible tension. The difference is already apparent when we take as reference **Deleuze's** 'structuralist period' (before the creative encounters with **Guattari** took place), expressed as he did during the defence of his doctoral thesis ^[35]: there, while stating that his objective is to address the "real spatiotemporal co-ordinates" of the concept of multiplicity as substance, he introduces the notion of virtual multiplicities that serve as "the condition of experience" by "enveloping pure intensities within a depth, within an intensive *spatium* that pre-exists as much every quality as it pre-exists every extension" - with this "depth being but the potentiality ["puissance"] of a pure unextended ["inétendu"] *spatium*". All happens as if, unlike the extended and extensible space of actual multiplicities, virtual multiplicities deployed an "intensive space". Yet, whether in processes of biological differentiation or in the simplest energy conversion, the potentiality of a resulting space - be it the volumetric deployment of the *converted* energy or the volumetric, extensible form (*morphology*) of the *differentiated* cells or tissues, etc - is not a design that exists in some unextended space before it is incarnated into a concrete space, but just a possibility already encoded, in the case of simple energy conversion, in an actual space (the space-function of the energy *before* conversion), and in the case of biological processes in the actual spatial order or configuration of a group of activated genes (or, better, cistrons) and their sequences, together with the spatial arrangement of the biological energy which these genes may actually be able to mobilize in a cell or tissue. There is no pure unextended *spatium* that only virtually exists in a DNA sequence, 'in a gene' to speak loosely, and which only becomes extensible by its translation into a process of differentiation or actualization. All conversions, differentiations and transformations are processes involving conversion of actual energy, are conversions of superimposed, co-ordinated Space and Time functions. Potentialities are not extra-energetic categories, and all virtualities are only potentialities of energy conversion processes encoded by actual 'states of energy flux'.

What was necessary for a physics of Time was (and is) a complex demonstration. It began by presenting Space and Time as two types of manifolds (two series of number-relations), but not because Space would be the domain of quantitative 'multiplicities', and Time the domain of qualitative 'multiplicities'. Instead, both manifolds had to be conceived as different in kind or quality, but such that both constituted at once, and *commensurately*, quantitative and qualitative relations. Simply put, Space and Time had to be conceived *as strict properties of energy*, of the energy-concept or energy manifestation. But to find Space and Time as properties of energy one also had to realize that Time is no more a single line, 'an autistic frequency', a mere timeline, than it is reducible to Space. It is a manifold because it is always produced by a *minimum, local, 'very' local, simultaneity of fluxes, of waves*, a resonant coincidence; it is always at least two fluxes, a 'multiplicity' of two terms called synchronicity, and one that only knows synchronization by relation to a third and an *n*th flux, through the phase beat of the so-called quantum *zwitterbewegung*, as our dear friend **Harold Aspden** has proposed and is fond of saying. The universality of Time, that which in the Newtonian world misleads us to think of a single and separate line - a single timeline - is merely a gross representation of the synchronicity of flows with regard to events, their permanent creation and their diachronic order. There is an Absolute, Universal and Single Time, a single manifold of synchronous and diachronic properties, and it is the expression of the singular energetic nature of the entire cosmos, of its profound unity of function; that's how "all is one". Indeed, in the aetherometric treatment of Time as a manifold of

timelines and an energy-function, it is already apparent that the times involved are not simply intervals of Time that are made resonant, synchronized or are factually simultaneous. In their quality of distinct and separate dimensions, they are already co-ordinated and commensurate *frequencies*, deploying as much a property of simultaneity (the coherent interval of Time) as the property of a diachronic beat (the coherent deployment of Time) that lies beyond any present and stretches as much into the past as into any future [36]. Lastly, as our own research in Aetherometry attests, such a demonstration would have to pass by the discovery of massfree energy as the real dynamic Aether, and the understanding of how Matter is composed solely of particular Space and Time arrangements of this Aether.

But enunciating a consistent and viable theory of Time and Aether, a theory that worked, would be tantamount to being able to draw a map of the conjunction of all eccentric contributions to science! For it would be the trail of eccentric science made to come to consciousness, as a science defined by its method, a micro-functional method, that managed to extract concrete energy functions and adequate concepts for Space and Time, without reducing one to the other, while demonstrating the difference between their intrinsic measures, and determining *exactly* their quantitative *commensurability*. As **Hume** proposes it [37], one discovers space by the disposition of visible and tangible objects, by the senses of sight and touch, and one discovers time in the perceptible succession or diachronicity of changes in objects, in their motion, in their states of motion. But the space that our sense discovers is not necessarily homogenous, independently of its obstacles or contours; it is a concrete volume of energy, occupied by energy in varying densities and phases of superimposition, and it is the concrete (“felt”) volume of all these volumes where motion (the motion of *something*) occurs (“takes place”, so to speak). Just as the time of our motions or the sound we hear, is the Time of an internal beat, constitutes a metric of Time internal to those motions, at whatever finite but absolute speed they occur.

At last, then, eccentric science would reveal, or have to reveal, its map of relations as the pursuit of the *functionalism* of the finest, the subtlest, the most minor, imponderable, lightest or ‘smallest’ possible, in thought and in science. So it is here, in the problem of manifolds and the finest possible perception that eccentric science should be situated as an understanding that seeks the micrological functions of energy and the physical nature of all spatiotemporal relations.

One by one, the ambivalences surface as so many ghostly obstacles on the only ethical path there is to knowledge, that of eccentric science. The ambivalences excuse themselves by turning **Ockham’s** razor on its head - against science as *congruent* knowledge, not in its favor and with strict respect to its method:

“In any scientific revolution, in which many antecedently-held propositions are to be rejected as false, there seems to be a principle of scientific conservatism, a principle that tells that as many as possible of the propositions previously held are to be retained in the new theory. (...) The more fundamental the proposition to the previous physics, the greater the desire to hold it intact.” [38]

Sklar has reformulated what **Thomas Kuhn** himself had already identified as the ultimate source of a ‘properly-speaking’ scientific resistance to admitting new facts and the totality of their conse-

quences. It is as if **Ockham's** razor had two different discrete zones of applicability: to the analysis of scientific data, *and* to the fit of a new discovery with respect to the overall tissue or fabric of science, read "of Official Science". A new discovery comes or breaks through when the razor is applied to the data and the new variable is legitimized. But the impact it is allowed to have is (read for "is", a moralistic and nonethical "should be") inversely proportional to how fundamental or basic is its nature or character, just so that the propositions - theorems and axioms - of Official Science be *minimally* disrupted. In other words, this second sense is about power, about a certain form and expression of power, about *Potestas* - it is not about science or the ethics of knowledge.

All the ambivalences permeating science, eccentric science, with respect to Space and number, Time and manifolds, energy functions, etc, are at bottom concessions made by eccentric science to Royal or mainstream science, to the royal power of Official Science. Concessions made with respect to the potential impact of each and any discovery because of the insufficiency of thought or technique, or because of political and military considerations. But **Ockham's** razor is part of the scientific method, not a *necessary* part of the epistemological tissue of science designed to limit impact, nor a *required* part of regulated competition in peer associations and through peer-review. It is not an excuse for conservatism, as **Sklar** calls it, or suppression - one that somehow is no longer a razor when it comes to the election of causal theories of Time to fill a dominant, mainstream, official role. This is a perversion of an overextended logic of the razor itself. A *minimized* impact is one that never explores the *maximum* impact, and so *fails to test at least one of the limits of the system or relation* that it preserves or wants to preserve.

Discoveries in basic physics are precisely changes that propagate consistently to rectify a multiplicity of concepts and functions. For a system that corrects by the *minimum* and must invoke *uncertainty of the unknown*, or worse, *an unknowable by definition* (as by definition of a fundamental uncertainty), to define and produce such a *minimum* certainly and unwittingly becomes a way to accumulate *systemic errors*, far faster than in a system that computes by *the known a maximum* of possible changes, and focuses on the periphery to *extend its certainty* or *decrease that unknown* by testing that *maximum*. These are two different strategies for two different practices of science.

So, yes, the ambivalences are part of a properly scientific problem, for the reason that this problem is the political problem of an unfinished war, an unfinished combat for the enunciation of a consistent scientific theory of energy - one that does not succumb to the mechanisms of Royal Science, nor to mysticism and metaphysics.

7. The problem of functional thought:

the ethics of knowledge and the aesthetics of art and of science

Religious mysticism and, later on, the mechanism of the New Official Science overcame primitive animism. With the dualist mindset, even with the dualism that includes mutual causation between body and soul (as in false parallelism), there is an assumed mysticism of affect, a transcendentalism of sentiments or an autonomy of passions. What is 'felt' ("senti") by a body is already what is *resent-*

ed (“re-senti”) by it - the trace of the sensation or of the feeling, the prolongation of an emotion but caught in a system of reaction that inverts the perceived and estranges the ‘felt’. A veil descends upon feeling, perceiving and thinking. **Reich** speaks of a *filter* imposed upon organ-sensations by the cultural structure of mystical man, a filter that was not present in animist cultures, in cultures without a State. The imaginary takes over the animist representation, and provides no end of fantastic and humanizing forms that distort perception. Perhaps the most critical factor is the dulling of perception, of sense-perception [39]. **Reich** speaks of a transference of organ sensations and their perception into a realm of pathological perception of “supernatural powers”, a superposed world of representation of sense-perception. It is the reign of superstition, fed by magnified fears, by repression and distortion of organ-sensations and perception, with the strength of an imaginary condensed in the form of religion - and in modernity, marketed daily by mass-media.

Spinoza speaks of a society where men are brought together by their passive affects, by their sad passions or sentiments - a culture of beings unable to form adequate notions, ie ideas having a non-representational and expressive content, accurate ideas. **Reich** also underlines the fact that the break introduced by the formal emancipation of the New Official Science, its mechanistic bend, is an aspect of the same mystical character, a continuation of it. Ghosts and phantoms, superstition and imagination, return in full force with mechanism, with the ideology of mechanics - with *mechanicism*. It is not just that mechanism leaves the religious question outside of the realm of science; it is that it orders the world through static categories, also representing it as a shadow world where mystical action at a distance occurs, or Platonic numbers and geometric forms alone have existence, or the order and direction of time depend upon entropy and causation, etc. A static mechanics is often attributed to **Archimedes**, whereas a dynamic one, a science of kinematics, is mostly attributed to **Galileo**, **Copernicus** and **Kepler**. **Reich** describes **Kepler** as an animist who sensed an animal force at work in planetary orbits. But Archimedean mechanics is based on displacement problems, it is also dynamic and not reducible to the simple lever; moreover, the simple introduction of motion is no longer sufficient for being anathemized by Official Science - for the question that ultimately matters in this regard is: which motion? Striated motion along straight lines, light rays or rehabilitated geodesics, motion that counts Space in order to occupy it - or vortical motion, wave motion, motion with intrinsic measures, that occupies Space as it generates it, in the strictest of senses? What view of dynamics is Royal, and what eccentric? The mechanistic representation of organ-sensations and sense-perception, is no more or less distorting than the mystical projections of religious despotisms. Mechanists remain attached to a form of irrationalism that obliges them to consider only machines that increase their disorder by increasing their entropy, mechanical machines; or only systems that involve mass-energy, seating all motion always and only in massbound particles (an old criticism already made by **Nietzsche** [40]); or only systems of Matter, where the living is absent or has been ‘fixed’, killed, made inert and ‘inanimate’ like Matter. Even when they study the living, or consider open systems such as autopoietic machines, most scientists rarely seize these systems other than mechanically, never from a bioenergetic perspective, as energy systems or energy machines - not mechanisms.

Dualism legated to us the soul as metaphysical essence and the body as a mechanism. But this divi-

sion is already a distortion of the real parallelism, the fact that the soul and the body have common functioning principle: massfree energy, the energy responsible for all kinetic states of Matter, living or nonliving, whether as latent energy, as Tesla radiation, or as sensible heat or electromagnetic energy. The same dualism that hides the principle of all motion, that staticizes motion, also hides the relation of thought and emotions to states of the soul and the body. In the animal state, action is a characteristic of instinct, and all reactions, including those of awareness and a biological memory, are subject to instinct. With animism, society worked on man to extract a system of reaction forces, consciousness, that could be activated outside and beyond instinct, beyond the animal nature of man, by the activity of culture itself and the memory of words, the language, that culture made possible. But then this activity is denatured by the emergence of State societies; the active forces cease to be capable of leading, dominating, ruling or commanding preconscious and conscious forces. **Nietzsche** says that reactive forces can always manage to subtract themselves from the command of the active forces, but they need to control culture to make this subtraction into a rule. It is the alliance of reactive forces in despotic culture that permits their damming of active forces. It is now an image of a reactive force that appears to signal the noble and the high in an inverted culture, and appears to command all forces. The passions of savages traversed both sadness and joy - and their 'way of being in the world' was too close to animal instinct to permit such erosion of active forces, including the activity of the culture they had invented. Only the bureaucratic, sedentarian revolution could have created human beings who would be willing to let go of their fundamental freedom along with the unconscious activity of culture. Hence, the animist ideas of savages are closer to the movement and essence of things and organs, their sensations and perceptions, than are the mystical phantasmagoric notions held by peoples tyrannized by despotism. Savages desire differently, think differently, than the subjects of a State do. Both kinds of human beings are led by passion to do something as a function of their own idea of '*object*' - which is what desire is and what constitutes its difference toward instinct - but the animist ideas of the savages are determined by a sentiment of passive joy, whereas those of State subjects are determined by negative sentiments, passions of sadness and survival. Yes, there is irrationalism in animism, as there is irrationalism in mysticism. But the former is a reasonable irrationalism, one that is not yet capable of forming adequate ideas but is searching for a sense, for *the reasons of Desire*. Mysticism, conversely, brings irrationality to its peak, makes a cult of it, *needs a Reason to desire*. And mechanism, with its cult of Official Science, stamps that irrationality as rational, scientific even; finds that Reason.

No theory of pure numbers (magical, quantic, relativistic, uncertain, probabilistic) or theory exclusively of Space or extension can ever lead to the formation of adequate ideas. No imperium of Reason, or divinity of man, either. Even modern-day biology and medicine will not save us, as they are replete with mechanisms, mysticism, dualism and hallucinatory alarmist fads. Without fads, there is no funding in modernity. From our perspective, **Reich** was correct in criticizing **Bergson** for having conceded to mechanistic science 'a correctness in the realm of inorganic nature' or nonliving systems. Quite so, it was too soon for any such concession. The world of Matter, the motions, exchanges, interactions of mass-energy, the existence of mechanisms for disorder, etc, none of this really can be understood if energy, in particular massfree energy, is not understood; if the relation between Space and Time, extensivity and diachronic synchronicity, is not understood as a functional

relation between distinct manifolds intrinsic to energy and flux; if all the properties, modes and attributes of a substance are not understood as *energy functions*.

One must not miscomprehend what is meant here. It is a scientific stance at the antipodes of that which has gained the adherence of our epoch. Our epoch has in fact moved away from **Albert Einstein's** viewpoint, for **Einstein** at least believed that science was only such when independent from the existence and bias of observers. Yet, our epoch has moved toward a different form of relativism than **Einstein's** proper - toward the relativism of the observer, the cheap psychology of relationism with its pretentious and mediocre claims to cosmogonic grandeur. This was already the object of disagreement between **Einstein** and the Indian poet **Rabindranath Tagore** on 'the nature of reality'. **Tagore** held that knowledge was always and only subjective, that even if absolute truth existed it would always be inaccessible to science. **Prigogine** and **Stengers** say that, "curiously enough" the development of modern science "has given reason" to **Tagore**, citing that no measurement or observation is any longer possible without reference to a "theoretical framework" [41]. Worse still, that it has become apparent how science limits itself to filling a particular axiom (*the framework*) with measurements, observations and experiments that only 'make sense' if that axiom is assumed. The fad of 'global warming' (now called 'climate change') is perhaps one of the best examples of this. It is as if science has become a conglomerate of various autistic, self-validating hypotheses that have fuzzy zones of 'validity', each with its coordinative and normative definitions which, *by definition*, do not permit crosstalk or interconnections, nor the formulation of a consistent framework that is anywhere independent from every and any observer, and yet compatible with all those observers that are adequate observers. *It is the framework of an integrated science that is thereby 'relativized', and science as an exact knowledge that is diminished.* Thus, the plurality of observers and an implicit status of equality between them has fragmented science into a general axiomatics of knowledge, one that refuses nature to have a reality that may be adequately known. There are only disparate working hypotheses. A *de facto* constation becomes thereby glorified. What would previously have been considered an error, can now become an accepted paradigm.

The perspective of eccentric science, it seems to us, is totally different: only when desire will become able to form adequate ('clear and concise') ideas of its object, will it become rational, come to find reason as a sense amongst others; and for that it needs an active joy, an emotion that shirks sentiment and human sentimentality, an emotion that creates (here, **Bergson** is indeed correct) and a method that connects, that makes adequate connections, connections that function - the real functionalist method of science. Writes **Deleuze**:

"It is from an active joy that those desires which belong to reason are born, because they proceed from an adequate idea" [42].

The problem of science is the problem of an eccentric science - not the statistical and staticizing concerns of Official Science. The problem of science is finding a functionalist method, a micrological, nonstochastic method to generate adequate ideas and measures of things and events that are intrinsic to them and to their relations; that method has logical and conscious steps, but it is above all the

method of an active joy, the joy that desires to think functionally, to see *differently*, to develop our active forces, to liberate them from reaction and sad passions: to liberate our unconscious activity - but this time beyond culture, beyond mysticism and metaphysics, *and* beyond Official Science. No eccentric science is possible without this active joy. It is the gift of adequate knowledge, the joy of comprehension (or, better, the joy to comprehend), and it is the gift of doing something for life, the joy of a knowledge that acts, but acts because it can form adequate notions of things, beings and their processes of change or motion. It is a joy that desires a functional understanding - mired neither in the imaginary and its passions, nor in mechanisms and their necessity. Writes Reich:

“The functionalist uses experiments to confirm or disconfirm his observations and the results of his thinking. He does not replace thought and observations by experimentation. [He is not a ‘pure experimentalist’.] The mechanist does not trust his thinking and observation, and he is right [not to trust them]. The functionalist does trust his senses and his thinking. He differs from the mystic and the religious believer by knowing his uncertainties and by being able to control them experimentally. He differs from the mechanist by including everything in his observation, by considering everything as possible, by breaking down the barriers between the sciences because he comprehends their interconnections, and by steadily and consistently progressing toward the simpler functioning principle.” [43]

To think functionally, an *active* joy is required. To act or comprehend, reason must be able to form adequate ideas. It needs the method of joy, an active joy that alone constitutes a rational desire. This is the problem of functional thought, immensely compounded by the fact that one exists in a humanized world which everywhere hinders joy and generates sadness, multiplies it senselessly *save for the Logic of Power*. No one can think adequately, if one is too sad to think. Since science is the collective product of human thought, it cannot hope to be saved by its method alone - anymore than it can by the cybernetic rule of automata that embody the methods and programs of science and engineering.

The real challenge of science is its minor becoming, but in the precise sense of a search for the functions, the energy functions, which create the thing or the event - which create the ‘thing-event’ *and* the immanent ‘sense-event’ of a thing or an event. All in one. An artwork is a ‘thing-event’ when it forms a complex of sensations or perceptions, a composition of sensational and perceptual elements. The sense of this arrangement or composition is itself an event, the ‘sense-event’, the in-itselfness of the event-art, of each art event, and it alone provides the intrinsic logic of the composition of that artwork - a logic which is not separable from the knowledge of the logic of sensation, from the know-how of a technique that operates with the synthetic functions of sensation, and which can only be conveyed by the knowledge and mastery of media, materials and the elements of composition. **Jorn** says that an act only becomes an event if it triggers a sensation or perception [44]. But such a trigger can only occur if the act is functional, if the act sets up a function capable of giving sense to a complex of sensations and perceptions that form the work of art. The sense, then, of the artwork lies in the very functions of the sense-perception that it synthesizes. A concept or idea is also an arrangement, a ‘thing-event’, synthesizing forms (linguistic and logical) with contents, with elements and their relations, with the senses of those forms, with their functions - what they do and how, what they relate and how. A sensation or a perception are no more separable from their sense than is a concept. The sense of a sensation is a function, as is the sense of a concept; the senses of things, artwork or natural things - the senses of sensations, perceptions - and the senses of ideas are, like the senses of

forces or values (axiology), their functions, their intrinsic articulations that inevitably call forth a context (the context that alone confers sense); they are so whether or not they generate effectively a sensation or perception, whether or not the ideas are adequate to the relations they supposedly encompass. An idea is wrong if it cannot account for the relationships it seeks to establish, explain and condense; if it decontextualizes the relation. And an idea is stupid if it seeks to establish no account of a relation, or denies the existence of a relation so as to not have to account for it. Not all wrong ideas are stupid, but all stupid ideas are by definition inadequate, and thus wrong. But that is not to say that stupid ideas have no function - they function by paralyzing or denying thought, and their function is, as Spinoza clearly saw, to make us sad, to make those who think them and consume them sad and impotent. They have a molar function - to serve a certain Power over and above Life. Likewise with works of art, they can make us dream stupid ideas or notions, or they can make us intelligent, capable of seeing something new, different, intelligent, capable of imparting joy, capable of making us feel alive. All that separates us from our power to act, to become active or unfold the active nature of desire - of 'our' desires - is the production of sad sentiments, wrong percepts and poor thoughts by art, philosophy and science. There is art, philosophy and science that only encourages superstition, fantasy, ghosts, the fantastic and the imaginary. **Asger Jorn** may contend that "only the fantastic may animate reasoning" and that "intelligence is to turn the impossible into the possible, or the unknown into the known" [45]. Yet, futurism and fascism are there to remind us of the power of the fantastic to render possible the most impossible horrors, the stupidest eulogies of Survival, or the knowledge of the most useless and gratuitous. All to make us *feel* dead.

Jorn was wrong - there can be no isolated aesthetic foundation to knowledge or science, and art cannot also be founded upon such an aesthetic principle if we are to differentiate it from science or philosophy. Science is not a form invented by art, waiting for a content to fill it. **Spinoza** was also right on this - the foundation of knowledge, and even the aesthetics of joining an experimental method or program to a logico-mathematical method (as **Spinoza** hoped to accomplish and **Galileo** practiced) - can only be extracted from an ethical concept of knowledge. By this, he meant the pursuit of a knowledge of nature that proceeds from an active joy and aims at the constant sharpening of sense-perception. Art is not synthetic and philosophy and science analytic, as if "in the negation of the scientific attitude is where we or one finds the point of departure of an artistic attitude having a purity just as perfect as is the quantitative knowledge afforded by science; for the artistic knowledge of an object can only be expressed by and through quality" [46]. No; the functions of art may indeed not depend upon an external (exo-referential) measurement of quantities, yet they are no less energy functions, just as scientific functions are no less required to take quality, concrete sensory and perceptual *qualia*, into account just because they are energy functions. It is the ethical conception of knowledge which is coextensive to artistic creation or artistic knowledge - not because art should serve a system of concepts, an ideational system or an ideology, but because art always plies one or the other of two possible regimes of human and animal emotions: a regime of the imaginary where art is *representation* and justifies the perception of a dull, uninteresting and sad life, enforces it and lends it human sentiments and identities; and a regime of *creation or presentation*, where art reaches for the energy fluxes, for finer perceptions of energy, opens up new possibilities for the living, employs the sensational, perceptual and conceptual functions constantly sharpened and isolated by science, to select from the impossible

only that impossible that matters, the impossible that makes Life possible - not more death, stupidity and horror.

Precisely then, one of the foundations of a minor art is ethical (the combat against obscurantism, superstition) and shared with all minor philosophy and all minor science. Thus, a minor art cannot shirk off the educative or formative function, it cannot retreat into the beautiful and *close in* the sensational world between the beautiful *and* the heavy, the Good *and* the Evil. A pure aestheticism of art is always an artistic moralism, an artistic ideology, a morality masquerading as art.

From the viewpoint of an ethical conception of all knowledge, whether artistic or 'analytic' or 'synthetic', there is no Good or Evil in nature, no moral dichotomy to be found in its fabric; all there is are ethical differentiations, ethical differences and different modes of existence of these differences - artistic, philosophic and scientific. Concepts that only serve to sadden are never adequate, can never be the source of adequate ideas of things and processes; they are not really concepts but abortions of concept; not even notions, but opinions, fantasies. Art that serves to sadden and block the grasp of a relation is not art, but the ornament of a material and spiritual misery - it is bad art, but also stupid art, also art that does not 'work', art whose use is only for a molar function, art whose knowledge can only be inadequate, art whose sensations and perceptions are boring and infantilizing - whether because it wants to limit itself to an aestheticism of living (a pretentious art of the living), or because it claims an anti-aesthetic rationalism (indeed, precisely what **Jorn** fought against). There may be good errors, but there are no joyful superstitions, no creative sadness, no adequate use of, or function to, a wrong or stupid idea, and no functional science in a mechanism. It is rather the power of stupid ideas that is always *external* to them; that's why stupid ideas only have molar functions, only serve the designs of Power-Potestas. Stupid ideas are ideas without intrinsic power, that's why they approximate empty forms which Power may employ to fill them with latent content. When it comes to science or knowledge, they are useless. It matters to select which impossible one makes possible; it matters to be horrified by all the stupid impossibles which become possible with every day of modernity; it matters to find a science of the anomalous, the singular, the unexpected, the microfunctional, even in what appears to us at first not to function. The task of science may adequately be defined as a having to know the unknown, but it matters to know *how* the 'known' is known or defined and taken as such - as being 'known'; not all 'knowns' are equivalent, as if they existed in a relationship of universal exchangeability or a relationship of necessary evolution. One can hardly valorize an art that makes one see what is not there, cannot become or come-to-be, and is mere fancy of the imagination; just as one cannot valorize any supposed 'known' and 'well-established' that resorts to such imaginings, as did the Lorentz-Fitzgerald transformation. What is taken to be a reality that is weirder than we could imagine, is nothing but another imagination still weirder than reality is or needs to be. The limit function of the speed of light is a shallow rivulet, a mere taboo; and the increase in inertial mass a mere phenomenological metaphor, needed by those who seek *not* to comprehend the inertial and gravitational nature of mass; those who avoid a consistent energy-based treatment of mass. The 'known' and 'known how' matter, just as the impossible that is being made possible matters, must matter - it is there that the entire struggle takes place; it is there that human beings struggle for their slavery and servitude with the dedication which one might expect of those fighting for their libera-

tion or salvation. And so it is that the oppression exercised by nearly all forms of religion presents itself as the very formula for salvation and 'freedom' - and it is here that the history of nation-States and mass-movements has always gone to find the source of its messianisms. Thus, one is inexorably led to conclude that plenty of what is 'known' and 'accepted' is useless for a joyful life.

There is, accordingly, a primary non-aestheticism of knowledge (science and art) which is ethical - which springs from the commitment of knowledge to the practicality of the living, from its subordination to an ethical concept of Life, as joyful knowledge; and there is also an aesthetic 'foundation' or 'principle' to such a knowledge - expressed as an active life, in the aesthetics of joy, as a principle of intensity. All happens as if in knowledge, art and science two independent and empirical 'principles' or relations always had to be synthesized, one ethical and the other aesthetic. The difference, then, between science on one hand, and art, and all other knowledge on the other, would be that science's aesthetical 'principle' includes an experimental research method. But can't art also partake of an aesthetic principle that employs an experimental research method, an experimentalist technique that assesses the effects of the art work, that evaluates the affects it impacts? Was this not already part of the situationist concept of 'situation'? Perhaps this is where art and science will cross again, in the employment of the experimental research method to generate the desired affects - 'desired' in the sense of a desire to effectively free affects from the constraints of power and its representation.

Precisely as **Jorn** points out ^[47], invention is already a scientific art, a becoming-art on the part of science. In this respect, **Jorn** proposes that art antedates science in the very sense that invention comes before discovery or any understanding, conferring upon the work of imagination a burden not unlike that placed on it by **Hume** in his empiricist philosophy. Accordingly, **Jorn** defended an Imaginist approach to art ("Imaginist Bauhaus"), arguing that "culture and technique [art] are human inventions", and that "the essence of invention is the eruption of useless forms (or of an imaginary and decorative utility" ^[48]), which may or may not subsequently come to encompass a given function or other. But more profoundly still, as **A. Eddington** and **J.W. Sullivan** argued in "*The Limitations of Science*", it is science which is an art (which **Jorn** acknowledges); **Jorn** agrees, citing **Newton** as an example of a real scientific breakthrough because something *new and completely different* had been *joined to* the formal logico-mathematical model: an experimental method, which **Jorn** argues is an aesthetic method (he speaks of the aesthetics of science, in this respect also, as the technique of science), an aesthetics of the experience that plies itself to extract the new, unsuspected and unknown - in **Jorn's** words, to "disinterestedly" extract "the concrete effect of sensorial qualities" ^[49]. So, more properly still, it is science that results from the fusion or synthesis of two arts - one formal and mathematical, and the other experimental or "sensational" (perceptual *and* sensorial).

Does one have to go to **Jorn's** extreme - that 'useless form antedates any possible function' - in order to avoid the moralism and monstrosity of molar functionalism, the dictate of molar functions that serve *Potestas*, into which the original Bauhaus degenerated? Invention, on its own account, is already a form of knowledge (the invention of fire is not separable from the knowledge of how to repeat it at will), and repetition is as intrinsic to its character as it is to discovery (qua condition for scientific verifiability). It is in the sense of technique that invention is an art and already a becoming-science on

the part of art. But the same could also be said of discovery. **Jorn** correctly sees that science cannot return to its old determinist doctrine where function alone determines structure and form; but he takes the probabilistic structure of science to mean that science is exclusively concerned with the relativity of truth and verifiability or confirmation, ie repetition. Inventions alone “provide a justification for scientific evolution”, he says. Hence, in his view, the real distinction between the artist and the scientist is that, in the former, the “aesthetic attitude was purer” [50]. But science is no more condemned to remaining probabilistic and relativistic than functions are condemned to have to be conceptualized and perceived as molar ‘functions’, by their molar use or their ‘human’ purpose, or than the essence of art lies in invention. Perhaps in order to put the whole “Imagunist” discourse to rest, all one needs is the simple realization that molar ‘functions’ are always imaginary ‘functions’, ‘functions’ created by a molar logic of ensembles, sets, machines - ‘functions’ that subordinate molecular functions and are independent of their content (the content can be anything as long as it *subjects*); that there are effectively two very different types of functions - those that obey “an economy of energies”, and those that obey a logic of Power, an economy of energy extraction. It is in this sense that in culture, it has always been a structure of Power that provides for a form and its content all the possible functions, as social (collective) articulations that ‘function’. Science, and biology in particular, knows enough to be forced to realize that function and structure in the molecular world emerge all at once, form and formation being indissociable parts of the same autopoietic (self-constructive) process. Molar functions that seek to subordinate the molecular proceed (by repression and antiproduction) inversely to the way molecular functions operate - as the former tend, instead, to be scoped macroscopically (by production and ordered accumulation).

Science is not just the synthesis of two different arts, one formal and the other experimental - a functional or scientific synthesis of two arts; it is a method to disengage the particular, the singular, the different, a method to differentiate what is molar and what molecular, a method to know “on the spot” so to speak, a method to investigate and permit finer perceptions of nature. It is a method to find the differential articulations between form and structure, and function or functions. In this sense, once again, there are two sciences - one, a science of the large numbers or molar ensembles, a science of the inertial effects of mass, a science of weight and collision, a science filled with probabilistic or statistical models, a science of striation that relies upon an arbitrary treatment of the number, upon a measure external to the materials and the interaction(s); and a science of the singular numbers, a science of levity and imponderables, a science of energy - of kinetic states and massfree energy - a science of the imperceptible, a science of how molecular functions come to overthrow, criss-cross, undermine and evade all molar ensembles.

Furthermore, the formalism of science is not reducible to the domain of the quantitative - as if its form were simply logico-mathematical. It encompasses a functional articulation of quantity and quality; how else could science come to understand “the concrete effect” of sensorial and perceptual *qualities*? Imagination would not have known how to suffice in this respect, as reality constantly proves to be at once more complex and simple than all the simplistic views that imagination can provide. **Jorn** argues that one “never knows what is the definitive destination of a new form” [48] - and how this applies to both art and science. But one is left wondering what is ‘a definitive destination’ - and

whether one even exists. In fact, the molecular functionalist argument that Aetherometry continues or prolongs is rather that any form, new or not, already carries its function, whether defined by a molar use (a function of Power) or defined as a molecular function. Ornament, the beautiful form, is not a useless form, anymore than powder or saltpetre is an empty form dedicated to the beautiful for as long as its use is limited to fireworks - as it was by the old Chinese Emperors. The beautiful is not devoid of a function or use - it is not useless by definition. Ornament ornates something - it is a function of something, and it is there - ornating something - as a function of a logic, an aesthetics, of the beautiful. Fireworks do not constitute a form, an ornament, devoid of function, and which might later on take on, as its final destination, the function of being the propellant of a missile. **Jorn** misunderstands the nature of the "Asiatic mode of production", the nature of the despotic Chinese State: it was a State created against war, where the ornament was as necessary for establishing the divine nature of the Emperor (fireworks: 'awe for the beautiful that roars') in the eyes of the people, the peasantry, as it was necessary for the State to preclude the technological development of the means of warfare - such as the use of powder in warfare - or the mining of metals for weaponry or commercial exchange (the latter being as feared as war was). The ornament precisely had an "Asiatic" or despotic function - a theatrical or spectacular use that befits the Power wielding it. And the use that powder acquired in modern occidental weaponry is no more its final destination than fireworks were.

So, against **Jorn**, we have to say that the so-called "empty form" or "new form" is never empty. Even when its content is self-same identical, even when it becomes pure fashion or vacuous, it still carries and provides a content, a content function - all those molar organismic "functions" that it can gather; it still obeys an internal logic, the logic of "that beautiful" that serves a certain form of power, *Potestas*; it still plies a determined use of the logic of sensation, perception and thought. The clothes may make the body - and thereby handicap it - but it is still a handicapped body that clothes dress, still a body with organic functions, no matter how starved, distorted and dysfunctional are these organic functions. What matters in art is: what is it good for? No art is good for nothing. Even ornaments serve a purpose, a molar 'function'. If it is good for keeping us stupid, for infantilizing those who make it and those who consume it - then its aesthetics is one of either anesthesia or "reality shock" (propaganda). One might wonder whether it is art at all in either case, since all the technique and invention it is left with is the inane reproduction of the vacuous - of the empty shell into which all human interactions are converted - and thereby it is art only in the senses that (1) any manipulation requires some technique, as **Machiavelli** would attest, and that (2) such manipulations only succeed by virtue of plying a certain technique, a certain form of art (if art be the right word) - and one that relies, above all, upon an unbridled, "futuristic" imaginary. Art can never condemn itself to useless and empty forms, devoid of sense or function, unable to educate or "form", and beautiful by its imagination. One is not condemned to the anti-aestheticist positions of **John Ruskin**, **William Morris** or **Henry van de Velde** - against which **Jorn** spoke, vehemently and well - simply by virtue of rejecting **Jorn's** reaction, the rule of the useless and the "imaginist" (or its function in the deformation of the image). What **Jorn** and so many other revolutionary artists seem to lose sight of, if it was ever in their sights, is that art, like science, is only good when it is good for making us see or understand something new and different, something that exists, something that *is* or is about to come, something that is *becoming* or about to become, and yet is either imperceptible or even merely virtu-

al. Precisely, the logic that is intrinsic to the process of creation of a work of art is what may or may not permit the work to induce such a perception, such a sensation, such breakthroughs, such anticipations of possible futures and such exorcisms of possible barbarisms. There is no place for opposing rationalism or science to sensation or art. Reason is only one of the senses, and each and every sense has its own reason. A work of art cannot make us see something new, cannot compose a new sensation with those who create it or consume it if its intrinsic logic, its composition, fails to crystallize the data, the milieu and the form of that new sensation, that *perception of the different*, that induction of thought and discovery, *that* potentially actual insight. It is this art which is nothing without science, just as it is a minor science which is nothing, neither minor nor science, without art, without this art or art in this sense.

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25. The present as a perpetually draining Time, and the past as "the eternal persistence of what (one) once was" (to quote Chabot, p. 43), has been or was at one time. Note that this way of presenting the problem is also limitative of the concept of Time-*Aeon* such as Deleuze presents it in his "*Logique du Sens*" (Logic of Sense). There he speaks of an "unlimited Aeon, where all becoming is infinitely divided into past and future, always ducking the present"; see Deleuze, G (1969) "*Logique du sens*", Les Editions de Minuit, Paris, France, p. 14. Here, the infinity of Time is 'an horizon line without start or finish', productive of all presents-with-their-pasts-and-futures whenever intersected. Only the present *exists* in Time, and only past and future *insist* in Time.
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27. Chabot, *op. cit.*, pp. 31-33.
28. Note that this is a different concept than Bernardo Bolzano's or Georg Cantor's concept of an ensemble as simply any collection of elements, no matter how dispar.
29. The same is to say, in a strictly algebraic sense, without changing its physical dimensionality.
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44. Jorn, A (1957) "Pour la forme - 'ébauche d'une methodologie des arts", re-edited in 2001 by Editions Allia, p. 46 (section on "form and structure").
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46. *Idem*, p. 65.
47. *Idem*, p. 61.
48. *Idem*, p. 43.
49. *Idem*, p. 60.
50. *Idem*, p. 64.