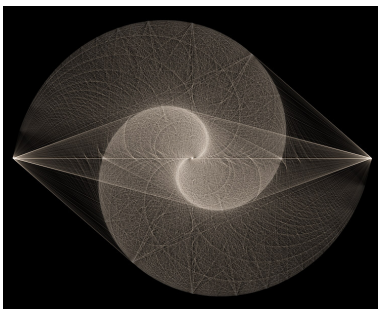


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Michel Serres and the Rhuthmoi of the Flow - Part 3

- Recherches
- Le rythme dans les sciences et les arts contemporains
- Physique
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Rhuthmic Perception Theory

At the juncture point between ontology and knowledge was the soul. According to Lucretius, the soul consisted of two parts: the *animus*, located in the chest, which commanded intellectual operations and will, and the *anima* which was spread throughout the body, received perceptions and transmitted in turn the impulses of the command center. The soul in both aspects could be shown to be corporeal (3.94-416). To make it short, anthropology could be reduced to physics and the human beings to *turbines*.

In Book 3 and again at the beginning of Book 6, Lucretius compared the body with a vessel which contained the soul as it would a finer fluid. But, Serres noticed, this metaphor did not bring us away from the flowing nature of things. This vessel leaked while being necessary to the concentration of the soul. Body and soul were necessarily co-existing.

So the vessel is porous, the basin crazes. It is, very precisely, an open system. Very superior, in its complexity, to an automaton in an interior medium. By the channels that it has left free the animated fluid flows and escapes. Effusion: it leaves; diffusion: it spreads. It loses its concentration, it spills everywhere, it takes up the volume available to it. From the locally open to the globally open. Everywhere and at random, the soul returns to the world and to chaos. It is therefore mortal, by a physicalist death, aleatory diffusion; it cannot exist without the body, that basin which ensures its concentration, at least for a while. It would spill if it were not constrained. (*The Birth of Physics*, 1977, trans. Jack Hawkes, 2000, p. 69)

Body and soul, if we may call them so, constituted a unitary complex that was "stable for a time" and "postpone[d], for a little while, the end anticipated by the law of dissolution" because it consisted in an "open system" which was "the seat of an exchange of flows."

But the vessel itself is a flow, although thicker and more complex. [...] The vessel and its fluid leak. But they are stable for a time. They can postpone, for a little while, the end anticipated by the law of dissolution. [...] This is his stroke of genius: the body, an open system, is the place or the seat of an exchange of flows; they enter, they leave. But these flows are, unitarily food and drink, Eros or perception, and intellectual information. (*The Birth of Physics*, 1977, trans. Jack Hawkes, 2000, p. 69)

As one may know, Lucretius believed that among the various fluxes that penetrated the body-soul, one was

particularly important since it allowed knowledge of the world: the one composed of the *simulacra* that were emitted by the multitude of things composing our environment. These *simulacra* were atom-thin and lightning-fast "images," that streamed from the surfaces of solid objects (or sometimes form spontaneously in mid air) and entered the eyes or mind to cause vision, visualization and dreams. In this theory of knowledge, Serres emphasized principally four aspects.

1. The *simulacra* streamed in all directions like "a spray of chreodes" as "an optimal form of the volume occupied by an object" from the "*sur-face*" of the "body" (*summo de corpore*).

There is a flux given off by things. By things taken as limiting cases [*de manière extrême* - as limits in mathematical sense]: *summo de corpore* (surface of the body), used eight times in forty lines (IV, 40 ff.). The surface is the summit, it is an upper face. I said a moment ago an ultrastructure. The simulacrum detaches itself as the optimal form of the volume occupied by an object, as a *sur-face* [*super-ficie*]. [...] In the vicinity of its banks, the object is no more than a spray of chreodes. (*The Birth of Physics*, 1977, trans. Jack Hawkes, 2000, pp. 39-40, my expl.)

2. They streamed the same way the atoms did in the primordial cascade.

If the model of perception is materialist, if the simulacra are formed of atoms and if their flow is governed by the general laws of propagation, then one model is reducible to the other. (*The Birth of Physics*, 1977, trans. Jack Hawkes, 2000, p. 42)

3. Contrary to skeptics' claim, they conveyed the exact shape of the object, provided they did not unexpectedly swerve, "here [was] the formation of turbulence," or naturally encountered obstacles or other flows of atoms.

This river never ceases to flow. Here is the formation of turbulence: *liquidissima caeli tempestas, perquam subito fit turbida foede* - ... just when the climate of the skies is clearest, it turns most suddenly dark and foul. (4. 168) (*The Birth of Physics*, 1977, trans. Jack Hawkes, 2000, p. 42)

4. We were ourselves both constantly emitting fluxes and immersed in "a space of communication" which was crossed by "fluxes of fragrance, of voices flying in the wind, of heat and cold, spume and bitterness" and "dense with waves."

Everything flows, objects are springs. *Fluunt, fluviis, undis aequoris, fluenter, fluendi*. Waves and fluxes of fragrance, of voices flying in the wind, of heat and cold, spume and bitterness. The perceptual space is dense with waves. All things are transmitters [*émettrices*], without interruption and in every direction; our senses ceaselessly receive. We are plunged into the space of communication. (*The Birth of Physics*, 1977, trans. Jack Hawkes, 2000, p. 49)

Thus perception is an encounter, a collision or an obstacle, one of many intersections on the way. The perspective subject is an object of the world, plunged into the objective fluencies. Receiver, in its place, transmitter from every point of view. (*The Birth of Physics*, 1977, trans. Jack Hawkes, 2000, p. 49)

This theory of perception and the larger theory of knowledge that it supported, which has been so many times mocked and ridiculed, were actually, Serres argued, closely related with the progresses made in mathematics thanks to Democritus and Archimedes. Coming back to the method of exhaustion presented above, he concentrated on the shrinking serrated space between the curve, the circle or the solid of revolution one tried to measure and the "broken polygonal path" with its "infinite increase in angles" that topped the "square turned myriagon" or "the pyramid that has an increasing number of faces" (p. 102). This extremely thin and irregular space was, according to him, the real as much as the intellectual source of the *simulacra* which were conceptualized in the poet-philosopher's mind and generated in reality from this infinitesimal space.

Now this operation [of exhaustion], strictly speaking, both has and does not have an end. In the vicinity of the smallest, we must decide. It is the passage to the limit. The curve precisely envelops this broken polygonal path. The surface is a boundary. It is an infinitely thin garment, cast upon this complex conjunction. A replication, as it were, though more of an application. Now observe the fluctuating muddle that separates and unifies the border and the conjunction, the limit surface and the infinite increase in angles. Literally and without metaphor, this space is fluent. It is the mobile deviation of a fine fidelity. Here, quite simply, is *the genealogy of the simulacra*, of these motile idols emanating from the surfaces, of the limit of the $\mu\delta\acute{\iota}\tilde{\alpha}$ - *eidos*. (*The Birth of Physics*, 1977, trans. Jack Hawkes, 2000, p. 102)

Serres compared Lucretius' theory of perception to Leibniz's theory of small perceptions and found it much more precise because it took account both of "the shape at the limit frontiers of atomic constitution" and of "the fluctuations of the phenomenon."

It is an *anologon*, on the same model, of the Leibnizian theory of small perceptions. Even richer, it would seem, more complete and better constructed, since it takes account through its borders of the appearance of the shape at the limit frontiers of atomic constitution, and of the fluctuations of the phenomenon. (*The Birth of Physics*, 1977, trans. Jack Hawkes, 2000, p. 103)

Although it certainly shed a new light on the theory of *simulacra*, this suggestion has triggered discussions among specialists. But, as far as we are concerned, it illuminated a question that we crossed already many times: the Atomist particular theory of form which supported the definition of the Democritean concept of *rhuthmós* and Plato's and Aristotle's critiques against it. Through the streams of *simulacra*, which faithfully transmitted "bit by bit," in a finer sense than that of computer science, all points constituting the constantly changing envelop of an object, that from was finely transposed into the sense of view. The *rhuthmós* was transmitted as the integral sum of the *simulacra*.

The flying wraps are the fluctuating edges, and the surfaces [are] limits. *Summo de corpore*. The simulacra peel away from things as when addressed via infinitesimals. [They are as numerous as you like.] Each object becomes the source of an infinity of envelops. [...] Every form is enveloped by an infinity of adherences, sliding infinitely from the virtual to the actual. (*The Birth of Physics*, 1977, trans. Jack Hawkes, 2000, p. 103, my mod.)

In other words, Lucretius provided a theory of perception that was perfectly adequate with the *rhuthmic* aspect of atomist ontology. What the *simulacra* conveyed was *the invisibly changing and impermanent shape* of the things. The simulacra conveyed *eurhythmically* in the sense of Xenophon (see Michon, 2018a) *the shape of any observed thing*:

because of their infinitesimal nature, they *most perfectly fit* the upper surface of the body, the exact limit of the atomic cluster, the ultimate envelop of the thing, exactly as the eurhythmic armor fitted well the warrior's body. Lucretius' theory of knowledge, which was naturally larger than his theory of perception, was based on an eurhythmic transfer of information.

Rhuthmic Theory of Forms

Similarly as Barthes' discussion on idiorrhymy, Serres' meditation on Lucretius provided the elements of a most convincing critique of the Platonic metrical paradigm and, if I may say so, a powerful *rhuthmic* theoretical alternative.

As for physics, Serres noticed, Plato did not draw out enough information from observation. For instance, when in the *Republic* he reflected on the spinning top (436d sq.), he completely failed to notice the very peculiar nature of this toy. He did not realize that such a simple artifact could open entirely new paths to physics particularly by tightly coupling rest and movement (p. 29).

But Plato's main problem was maybe more theoretical than empirical because he did not lack spirit of observation. Plato's very speculation, Serres argued, has been limited principally by the primacy he granted to geometry upon theory of number and, in the latter, to rational upon irrational numbers. In contrast, Lucretius' physics obviously benefited from the elaboration by Democritus, maybe, and Archimedes, more surely, both of a new geometry and a new arithmetic (p. 29).

With Democritus and Archimedes, the Pythagorean mathematical paradigm that irrigated Plato's thought and resulted in Euclid's *Elements*, was subtly challenged. A "local mathematics, or, as it will be called, a differential geometry" opposed a "global mathematics."

In the three cases listed, the indivisible [tangent and atom], declination [*clinamen*] and contours [with the theory of knowledge through perfectly fitting *simulacra*], we are concerned with a local mathematics, or, as it will be called, a differential geometry, an ultra-precise analysis of proximity, which in every place repeats the question: what happens as close as possible to the singularities? They are all different from the recognized Greek tradition, the one leading straight from Thales or Pythagoras to Plato. Strictly, they are also contrary to each other. Democritus takes for his subjects what for Platonists is an accident, and what for Pythagoreans was a disaster. They may be contrasted as a local and a global mathematics, as a science of idols and a science of ideas. [...] To the eyes of a Platonist the mathematics in question is false; for an Epicurean that of the *Timaeus* or of the dominant tradition is false. By true or false I mean these values with regard to the chosen system. (*The Birth of Physics*, 1977, trans. Jack Hawkes, 2000, p. 103, my mod.)

One of the main stakes of this mathematical divide was the concept of form and consequently that of rhythm: its Platonic definition as heavenly, eternal, abstract and "global-mathematical," i.e. "rational" entity (as much as its Aristotelian more empirical version) *versus* an earthly, ephemeral, concrete and "local-mathematical," i.e. "differential" one. Whereas the former was based on the concept of "Idea" and reached directly (or indirectly through observation) by the intellect, the latter mobilized that of "idol" or *simulacra* and was first to be observed through the senses then elaborated by the mind. In other words, Archimedes and maybe Democritus provided the necessary mathematical and physical devices to give plain meaning to Democritus' particular concept of form, i.e. *rhuthmós*. They allowed for the first time a genuine *rhuthmic* epistemology.

The ideal forms of geometry are not transparent, invariable and empty, they are dense and compact, full almost to saturation, of a complex tissue, and covered, around the edges, with invisible veils which yet allow them to be seen, infinitesimal limits that nonetheless are there. Differential robes that glide over the shapes. [...] Hence the two opposing theories of knowledge: idols and ideas. (The Birth of Physics, 1977, trans. Jack Hawkes, 2000, p. 103-104 - Serres' italics)

Ontologically speaking, there were no perfect, permanent, eternal and fixed Forms. These, mostly circle, triangle, rational numbers and proportions, were to be replaced by an Archimedean paradigm of helix, vortices, irrational numbers and infinitesimal calculus.

The Pythagorean or Platonic circle becomes the Archimedean helix. In other words, nature is not endowed with perpetual motion. (*The Birth of Physics*, 1977, trans. Jack Hawkes, 2000, p. 58)

Physically speaking, "forms" were constantly in "nascent state," they never stopped appearing, changing and melting. Forms produced new forms which produced in turn another generation of forms.

What is nature, if not the aggregate of objects, these forms that are in a nascent state and which transform this form? Thus the open circulation of the flow in general, the indefinitely broken cycle of spirals. Pseudo-solid volumes in which implication is undone, whose resistance melts. (*The Birth of Physics*, 1977, trans. Jack Hawkes, 2000, p. 92)

Form produces forms, the productive agent and the product each causing the other. (*The Birth of Physics*, 1977, trans. Jack Hawkes, 2000, p. 106)

Epistemologically, "forms" were not Platonic "ideal Forms, seen as empty and transparent" of which human beings met only deficient replicas and which could be known, strictly speaking, only through speculation.

The mathematics of the Epicureans, emerging with Democritus and given canonical form by Archimedes, is a science of images [*idoles*]: neuter producing infinite multiplicities of form. Auto-productive forms. The thing was inevitable given the realism of the compact and the dense, a prelude to physics; it opposes point by point the realism of ideal Forms [*idéalités*], seen as empty and transparent. Either the lucid subject and the luminous object, or the subject-object compact through and through. (*The Birth of Physics*, 1977, trans. Jack Hawkes, 2000, p. 106)

They were not either Aristotelian forms that would be reached through observation but that would be productive and final entities driving the process of actualization of matter until completion. They were only occurring shapes, observed in reality or dream, and recognized by the transmission of the infinite number of infinitesimal points that compose the envelope of things.

But how can we explain this physical process [of production of forms], in its turn? With mathematics. With Democritus, who revealed the atomic constitution of shapes, and the infinite process of formation of their edges. (*The Birth of Physics*, 1977, trans. Jack Hawkes, 2000, p. 106, my mod.)

According to Serres, this new physics triggered no less than "a paradigm shift" in physics, that became "more physicalist, less mathematicised (since it lacks a probabilistic organon) than Platonic knowledge, more phenomenal, less metrical," according to a "fluid model."

We would say that what we have here is paradigm shift. Science remains science and laws remains laws, what changes is the global contract. The general design of what the learned agree to call physics. [...] Epicurus, Lucretius changed the paradigm. [...] The new knowledge is aware of stochastic phenomena: *incerto tempore incertisque locis* does not signify the nullity of place and time, and thereby a passage to the soul outside the world of sensible qualities, but simply aleatory scattering [2.263]. It is informed, since Democritus by infinitesimal questions. It is inspired by hydrodynamic models and looks towards the formation of living systems. It is more physicalist, less mathematicised (since it lacks a probabilistic organon) than Platonic knowledge, more phenomenal, less metrical. But, above all, Athens is by the sea. The elective model is fluid. It is no longer crystal, or the five polyhedral solids, the body of the *Timaeus*, it is flow. (*The Birth of Physics*, 1977, trans. Jack Hawkes, 2000, p. 112)

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