

It is time to think the Anthropocene ! A manifesto.

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Accepted for publication in Leonardo

What could be the meaning of a scientist engaging in art? What could be his or her motivation? Why such an imperious feeling, as if touched by a magical wand and relinquishing all free will, as if obeying a command to explore and physically expose flesh and blood — from beneath the armour of the scientific proof — to slings and arrows?

I have been wondering about this for a long time: Where do this acute sense of urgency and this intimate conviction that scientific outreach to the general public is mostly awkward and inadequate originate from? The question comes along with the intuition that we, scientists, should reveal the other side, dark and bright, shadowy and sublime — the side we do not master nor even understand, but where true progress and scientific breakthroughs happen — and with the need to stop our soliloquy to allow the story to be told by the public, in an inversion of the flux that would then permit public “*inreach*” and input to be injected into science, as an enrichment.

The work I have been conducting inside the art collective *Labofactory*, with the duo HeHe, with Anaïs Tondeur and several other artists does not aim at demonstrating scientific phenomena, nor at assigning proofs and inviting the public to join a scientific journey to discover facts, but simply at suggesting a different point of view, an unsettling transgression, an uncomfortable simile, a physical experience, a metaphor of physics that would make use of scientific imagination to reinvent our perception of the world and question the relative and fragile truth.

In the *Fluxus* installation done with *Labofactory*, thin transparent wave tanks are envisioned as silent soft drums. The artistic narration then becomes a score ruled by the physical properties of the drums, their resonant notes, attacks and vibratos, building a visual fantasy with their inverted materiality, the water remaining transparent while the cold fog rising into the air above the interface is the only visible matter.

In *Domestic Catastrophe #3: La Planète Laboratoire*, created with HeHe, a realistic toy globe is rotating in a tank that looks like a scientific installation. At regular intervals, a fluorescent green cloud is emitted and spreads a thin atmosphere that spirals out from the pole to the equator and vanishes in the liquid ether with which it merges. Although the physical phenomena at work in the toy globe do not correspond to anything similar in the full-size planet, still the metaphor operates and conveys our vision of planet Earth as a delicate spaceship with no windshield and no protection against our action from the inside.

In the *Earthquake machine* created with Anaïs Tondeur, basalt rocks brought back from an expedition to the emerged part of the mid-Atlantic ridge, stressed by the constraint of spring-mounted tectonic plates, suddenly tremble, rotate and slide and their giant shadows threaten the very stability of the showroom. Meanwhile the *AMOC Last Water Dive* installation stages a parallelepipedic ocean in which deep water periodically forms and eventually sinks, mixing the entire volume of water and thereby slowing the real ocean thermohaline circulation. The density variation, turbulences and wave motions inside the fluid are revealed by shadows on the gallery wall and keeps evolving visually over the weeks as waters continue to mix until they totally disappear, when, at the end of the exhibit, the content of the tank becomes homogeneous.

These joint ventures with artists engaged with such different statements, public interactions and coming from diverse research paths— collaborators all puzzled by my mysterious and compelling commitment to Art & Science — have brought me to realize, however, that these actions entail a deeper meaning and involvement.

For the first time in history, human kind, which should have been but an ephemeral marginal event on the geological scale, is facing a lethal threat directly linked to its own action and to its unquestioned, unspoken, unthought use of science and technology. The fascination operated by science on everyone's mind — starting with scientists themselves — is still extremely powerful, as testified by the recent media coverage of the probable observation of the "Boson de Higgs"; it has given science a tribune and changed critical thinking into permafrost. So science needs to be re-enchanted, re-invested in a humane way in order to allow new stories to be thought and told, as part of a modern "Chanson de geste" dedicated to globally sustainable acts and viable thinking paths.

Scientific omnipotence and faith in progress have now become nineteenth and twentieth centuries' narratives: They have lost their edge and their elusive, fading voices call for a global rewriting of the story. Presently, scientific advances are often more perceived as a threat than as a progress. Scientists are starting to grasp that science and scientific approach in itself might be inefficient to solve or even envisage the reality and the meaning of, say, climate change or of nowadays' new frontiers such as the unsolved issues of life and consciousness.

A large part of my scientific research and art & science works have been concerned with the question of climate change, and more precisely with how to predict, analyse but also envision what is presently encompassed by the word "anthropocene": the controversial use of this very term as a manifesto questions human impact and ethics and calls for collective as well as individual involvement in the definition and construction of a new deal with our small, lonely and fragile vessel earth.

Such global issues and challenges escape the scope of science, which is meant and expected to split apart a complex intricate problem into small systems in isolation, broken down to the limit where the issue may be studied in a lab experiment, through computer memory or as a model inside a scientist's mind. Science has never been intended to reassemble the fragile and complex system in its comprehensiveness, a little like, when I was a child, I kept disassembling broken watches and clocks to get a proper

understanding of their mechanics, fascinated by their spinning gears and spiral heart, but always failing to make them tick and beat again.

We in fact need a different protocol, a different approach and novel analysis scheme to tackle the complex and challenging multiple phenomena involved in the anthropocene concept. We need global thinking, or more precisely a syncretistic vision that, like the global intuitive perception of small children, has been overshadowed by the academic rational thinking that is missing a relevant representation and only breaks down the right questions into worthless rigorous sub questions. In art this unfragmented syncretistic representation has been explored in particular through cubism in a quest to "*learn how to draw like a child*", but in science the question of how to acquire and develop such a global, more intuitive and more direct vision is pending and has not even been articulated yet.

The precautionary principle, first endorsed when the World Charter for Nature was adopted by the United Nations in 1982, has been designed to deal with questions so complex that science has failed to find a solution for them in the state of our present knowledge, established facts, observations and certainties. But such a principle is extremely difficult to apply, since coming up with a strategy would require at least three ingredients which are presently lacking: Quantifying statistics for the uncertainty stemming both from our present ignorance of the system and from the intrinsic variability of the physical mechanisms involved, quantifying with a measure of potential dangers (lost functions) and of actions that we may undertake (cost functions). Should such a strategy be designed, we would still lack means to enforce it upon governments and populations that would reappraise this politics and weigh it against their own interests. In particular, responses to the crucial issues raised by the new anthropocene era would certainly require drastic changes in behaviour that could not be obtained through mere pedagogy, since the necessary level of action could only be achieved by an intimate conviction and implication of all. Only then the tragedy of the commons has a chance to be ended¹.

In order to tackle such complex issues, our vision not only needs to be syncretistic but also global, i.e. shared and carried by an extremely large group of human beings. The very meaning of the word anthropocene and the very nature of the coming era will result from the sum of all individual and collective human stories and actions we will undertake in response to this collective representation and verbalization of the mankind trajectory. Science alone, however, cannot produce such a vision.

Science is but a specifically contrived and powerful protocol: in order to cope with present observations, it offers some new mathematical models that are highly idealistic and extremely limited in essence, then derives new predictions to be confronted with new measurements until the model becomes inconsistent with observations, and then starts all over again. Through such a protocol science seems to be doomed to perpetually move from incomplete models to inconsistent models without any hope of ever reaching what was once thought of as the available truth, as the universality, as Gödel² formally

¹ Hardin, G. The Tragedy of the Commons. Science, Vol. 162, pp: 1243–1248, 1968.

² Gödel, K. On Formally Undecidable Propositions of Principia Mathematica and Related Systems. Dover, 1962.

demonstrated for a family of problems in his celebrated incompleteness theorems, back in the 30s. The scientific narrative, then, is to pretend that the model itself is a representation of the world, disregarding the fact that science will never be able to fully describe the dynamics of this model (e.g. imagining the universe as the interaction of all the elementary particles does not bring any insight even at a statistical level, since the procedure that would smoothly reconnect the microscale to the macroscale largely remains to be invented, in particular for systems out of equilibrium). Nor will science be able to validate the model (due to the extension of the incompleteness theorem) or to even establish (in writing) the model for complex systems in interaction as are involved in climate dynamics, since partial models are lacking (as in the case of the cryosphere) and since the coupling between sub systems also remains to be determined (even for simple quantities such as heat fluxes between the cryosphere, the oceans and the atmosphere). Considering all these limitations, science itself should be viewed as a way of rethinking our world, but only as one among many other protocols and practices. In my opinion, science should then be considered as one specific approach, that I will call artistic in the sense that scientists — as other artists — enact their specific approach in the real world and engage in their vision through real or virtual expeditions and thought experiments (gedankenexperiment). Once the performative nature of scientific research is recognized and science itself perceived as a specific artistic practice, a shared syncretistic vision of societal challenges may emerge, but only from the confrontation with other artistic practices, all as legitimate as science since they simply use a larger variety of narratives to interrogate our perception, representation and thinking of the world. Art & science encompass all performances and narratives necessary to stage this confrontation, question our beliefs and observations but also the nature, legitimacy and ethics of our scientific practice without the usual limitations imposed on critical thinking by the quasi sacralised (and thus "unquestionable") proof protocol. Once such a sensible common view has been constructed through art, art & science and science narratives, it should affect the actions of all individuals and communities and, as a side effect, may contribute to determine a most sensible path science should take, or at least bring back critical thinking into science³.

The *Lost in fathoms* exhibition conceived with Anaïs Tondeur is enticing the public to cross-examine their own perception of the anthropocene through the fiction of the lost island Nuuk, the physical presence and invocation of telluric forces, the mantle convection, the ridge and the abyssal plunging of a now fading deep-ocean circulation. The *Terra bulla* video, made for the Carbon 12 exhibition, of a hemispherical soap bubble illuminated in bright and dark orange fringes animated by internal motions forced by the wind is evoking the fragility of the planet itself rather than the vanity of human ephemeral life. The *Fluxus* installation convenes our memories of the ocean but its waves themselves are strange and disturbing due to the obsessive presence of fog. *Domestic Catastrophe #3: La Planète Laboratoire* recalls hours spent spinning a globe as kids, but the bright green cloud that now wraps the planet seems to reach space itself, to pollute the very luminiferous aether. These installations do not aim at taking a posture nor do they pretend to popularize any scientific fact or give definite answers. Unsolved fiction and the multiplicity of forces at play, with their own fascinating dynamics

³ Morton, T. *The Ecological Thought*. Harvard University Press, 2010.

Zylinska, J. *Minimal Ethics for the Anthropocene*. Open Humanities Press, 2014.

involving a large range of time scales and the human nature, derisory and sublime, of scientific pieces and evidences collected, should raise public awareness for a necessarily broader critical view which would re-interrogate our own perceptions, memories and stories to us told, and for our common responsibility in building a new syncretistic vision.