Universe / Irreverse

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At the workshop "Mapping the Irreverse" that brought us – practitioners from the arts, humanities, and natural sciences – together, we were confronted with an entirely new term: *Irreverse*. We were given the opportunity to interpret this term in a way that suits our purposes, that best conveys our message. But of course it does not float entirely free in the space of significances, since it has clear etymological connections to 'irreversibility' and 'universe'. Irreversibility is the opposite of reversibility, the property that something can be brought back to a previous state. The word 'universe' contains the same Latin phrase 'vertere', signifying "to turn (back)". So 'universe' literally means "to turn/change (con-vert) into one" and the use of this word with the same meaning as it has today can be traced back to Cicero.[1] The universe is everything as one thing, the whole world, and the term often occurs in a scientific context. But is reversibility already included in such a terminology? And does the recognition of irreversibility conversely lead us away from the one-ness of the uni-verse? I will argue here that this is exactly the case, when the universe is thought of as the scientifically described world and the 'one' that everything is turned into is not just a mere collection of everything that is, but is a metaphysical notion: one principle (as in one unified theory), one substance (as in one family of elementary particles), or even just one natural science. This Universe will henceforth be denoted with a capitalized initial letter.

So, two poles are created here, on one side the Universe and on the other a hypothetical Irreverse. The Universe, in order to be scientifically intelligible, must obey a certain scientific *a priori*. The world needs to be reducible into certain building blocks: identifiable, independently existing and self-identical entities. They can either be classically situated in spacetime as a fixed reference frame or, more modern, they span spacetime themselves by their relational structure. Usually, one thinks about a small number of elementary particles with an even smaller set of unique properties that constitute the whole Universe. Such particles are – within one kind – completely interchangeable and allow no individuality. Between them, a mesh of interactions is active through the exchange of other elementary particles, and the resulting forces either bring the particles into motion or stabilize them into rigid forms. In such a Universe, strict rules can be formulated, tested, and the whole scientific enterprise might begin.

1. C.T. Lewis and C. Short, *A Latin Dictionary* (Oxford University Press, 1879), 'universus'.

A radical consequence of living in the Universe as a scientifically-structured world was described by the French revolutionary Auguste Blanqui in *L'Éternité par les astres* (1872). Although being a *révolutionnaire professionel*, he set down exclusively astronomical ideas in this work that was entirely written in his prison cell in the island fort of Taureau. It includes a cosmological hypothesis: In an infinite and eternal universe, a finite number of building blocks will always recur in the exactly same configuration as before, thus everything will eventually repeat itself in precisely the same way and that again and again, an infinite number of times. The same thought was formulated more prominently by Friedrich Nietzsche in *The Gay Science* (1882) and more profoundly later in *Thus Spoke Zarathustra* (1883). It appears together with the basic formula from "The Drunken Song" that "joys all want eternity"[2] which can be understood as a moral principle: to live in such a way that one would gladly accept repeating the same again and again. The inescapability of eternal return then leads to Nietzsche's *amor fati* and a rehabilitation of fate in general.[3] In Milan Kundera's novel *The Unbearable Lightness of Being* (1984) the same idea, expressed by the German proverb "einmal ist keinmal" ("once means never"), attaches heaviness and thus significance to a life in eternal return. This is opposed by the lightness and insignificance of a "you only live once". A purely mathematical reason for eternal return was already given by the antique Pythagorean school, for whom everything was based on numbers and on principles of harmony. It was written that "numerically the same things recur" and that "everything will be the same, and so time also."[4]

Now while modern science – despite the concept of inflation, an exponential increase of the cosmos' size over a very short time that occurred according to the theory of the Big Bang – not necessarily allows the cosmos to be infinite, nor eternal, the availability of fixed building blocks following clear-cut rules still allows processes to reoccur, to be controlled, and eventually to be reverted. This implies the possibility of dominance over Nature. So, there is also a technocratic agenda behind the harmless sounding property of reversibility. Such an instrumental approach to science is almost impossible to resist as soon as it becomes available and sets itself apart from an aesthetically inclined viewpoint. But control over Nature comes with the price of also being controlled by it. In a Universe where fixed laws prescribe the orbits of the celestial bodies, to which we mortals are inseparably gravitationally bound, the same laws also apply to us, thus limiting our capabilities and determining our fate. Notwithstanding the fateful consequences for our

2. Friedrich Nietzsche, *Thus Spake Zarathustra*, trans. Thomas Common (The Modern Library, 1917), p. 365.

3. Byung-Chul Han, *The Scent of Time: A Philosophical Essay on the Art of Lingering*, trans. Daniel Steuer (John Wiley & Sons, 2017).

4. Simplicius, *On Aristotle's Physics 4.1–5, 10–14.*, trans. J. O. Urmson (Cornell University Press, 1992), p. 142.

liberty, such an understanding fitted well to a mechanistic and fully deterministic physics, a science of levers and gears that neatly match and turn in eternal productive cycles. Also, the thought was well adapted to the new hegemonial economical and political structures that emerged during the age of industrialization.

Important philosophical groundwork in the wake of modernity happened in England during the 17th century. This included a fundamental debate about the experimental method in science. Previously, it were purely logical arguments that had to be brought forward in order to reach a conclusion. Instead, Robert Boyle, who earned fame for his vacuum experiments that were possible after he substantially improved the design of air-pumps, opened up a "theatre of proof" where "credible, trustworthy, well-to-do witnesses gathered at the scene of the action can attest to the existence of a fact" and such "invented the empirical style that we still use today."[5] The best and most reliable scientific experiments are actually highly staged events, dramas where Nature performs in front of a distinguished and critical audience. In this new approach the eternal return found a practical counterpart in the reproducibility of scientific experiments, today heralded as one of the main features of scientific inquiry. Here it is again, the "einmal ist keinmal" that demands a certain factual heaviness from the description of worldly phenomena in order to recognize them as scientific facts.

Such factual heaviness was found in new (and reproducible) findings about blackbody radiation, the photoelectric effect and radioactivity early in the 20th century. As they gained inertia they led to the birth of modern physics. But even before this happened the mathematical universe got seriously shaken in the 'foundational crisis of mathematics'. It started with a proof of Georg Cator in 1874 that showed that the real numbers, which include expressions like $\sqrt{2}$ that cannot be understood as the ratio of two integers, are strictly more numerous than all the numbers we use for counting. Between any two numbers lies the uncountable vastness of the continuum. While the Pythagoreans already were well aware of this irrational abyss, they despised its existence as a threat to harmony. And this not without reason, since Cantor's discovery suddenly made set theory, which lies at the core of mathematics, a completely non-trivial matter. It means that now there are various forms of 'infinity', thus also strictly different infinite sets, and those who dare are led into the domain of transfinite numbers. Feared by the mathematical ancestors of antiquity, for David Hilbert, who was the main proponent of formulating the course of mathematics in the early 20th century, this abyss was a "paradise" from which "no-one shall be able to expel us".[6] Thus, mathematics expelled

5. Bruno Latour, *We Have Never Been Modern*, trans. Catherine Porter (Harvard University Press, 1993), p. 18, after ideas expressed in Steven Shapin and Simon Schaffer. *Leviathan and the Air-Pump. Hobbes, Boyle, and the Experimental Life.* Princeton University Press, 1985.

6. David Hilbert, "Über das Unendliche," trans. Wikipedia, *Mathematische Annalen* 95 (1926): p. 170.

itself from its ancestral territory of a harmony that one could count (on), where every point could be reached by simple increment. Instead, it settled in a transfinitely larger and far more chaotic space that it then started to colonize.

And indeed the mathematical mastery over the continuum, the doorway into this paradise, provided science a line of flight out of a Universe of dull repetition: Between any two numbers there is not only a third one, but a whole cosmos opens up into which we can escape in order to not get stuck in recurrence. This vastness of possibilities implies a weakening of eternal return into the Poincaré recurrence theorem. It states that a broad class of systems in motion will always return after a possibly very long time, but only arbitrarily close and not exactly to their previous initial state. But before that happens, usually the forces of chaos, a mathematical field that also dates back to Henri Poincaré, manifest themselves. They offer an even more radical escape route away from fateful predetermination, since they render a system utterly unpredictable in the long run. Therein, even under the reign of completely deterministic laws, a small perturbation of the initial values can have drastic effects. Chaos means exponentially high sensibility following from full causality. Yet, such findings do not at all mean that one henceforth waives the claimed command over Nature. It would not be science, if it was not aiming at strengthening its grip on all worldly phenomena again after each such blow from indeterminism. But even with the insight from new theories, the origin of irreversibility still remains controversial[7] and is part of an ongoing debate closely connected to the mystery of time.[8]

Each new theory forms a line of flight from the established order of our previous intellectual achievements into an uncharted wild territory. They will emerge time and time again and if followed, they are usually linked to progress in the form of Kuhn's "paradigm shifts".[9] The words of Ilya Prigogine beautifully summarize the situation:

> "The basis of the vision of classical physics was the conviction that the future is determined by the present, and therefore a careful study of the present permits the unveiling of the future. At no time, however, was this more than a theoretical possibility. Yet in some sense this unlimited predictability was an essential element of the scientific picture of the physical world. We may perhaps even call it the founding myth of classical science. The situation is greatly changed today. [...] Theoretical reversibility arises from the use of

7. John Earman, "The Problem of Irreversibility," in *PSA: Proceedings of the Biennial Meeting of the Philosophy of Science Association*, vol. 1986, 2 (Cambridge University Press, 1986), 226–233.

8. Cédric Villani, "(Ir)reversibility and Entropy," in *Time: Poincaré Seminar 2010* (Springer, 2012), 19–79.

9. Thomas S. Kuhn, *The Structure of Scientific Revolutions* (University of Chicago Press, 1962).

> idealizations in classical or quantum mechanics that go beyond the possibilities of measurement performed with any finite precision. The irreversibility that we observe is a feature of theories that take proper account of the nature and limitation of observation. [...] Have we lost essential elements of classical science in this recent evolution? The increased limitation of deterministic laws means that we go from a universe that is closed, in which all is given, to a new one that is open to fluctuations, to innovations."[10]

The opening up of the Universe precicely means that new lines of flight appear within its fluctuations. I claim that this happens for a basic reason that is apparently hard to accept for the natural sciences: because there is simply always more. Every object is unique and in its essence will always be different from how it appears to us or to anything else,[11] just like an object of experience is never identical with itself.[12] This essence can be interpreted as the infinite potentiality within everything, the full freedom and transformability of a body without organs.[13] Not a single phenomenon is ever fully studied or understood. The uniqueness of everything then means that nothing will ever reoccur in exactly the same way, or can be reverted to an original state that anyway eludes its description. The whole Universe is just a glimpse on something that is always and forever larger, more detailed, and thoroughly mysterious. And while we deliberately try to map it, it just continues to grow in depth and width, explodes into a tightly knotted mesh of context,[14] exponentially faster than our knowledge increases. No wonder that we need to hypothesize about an 'inflation' of the Universe. Let us remember the immense abyss that opens up between simple numbers. The same can happen with anything that we zoom into, while our knowledge forever just seems to touch the surface. The perfectly precise one-to-one map, like in Jorge Luis Borges' short story "On Rigor in Science" (1946) – apart from its summoned impracticability – cannot exist if the world around (and in) us transforms and twists itself into ever even stranger forms. The deepest insights we get are the moments when something really weird and unique happens, a unique flash of originality instead of the consistent and explainable ticking of our Universe's clockwork. In the work of Timothy Morton the same attitude towards the world is displayed.

> "We live in an infinite non-totalizable reality of unique objects, a reality that is infinitely rich and playful, enchanting, anarchic despite local pockets of

10. Ilya Prigogine, *From Being to Becoming: Time and Complexity in the Physical Sciences* (W. H. Freeman / Company, 1980), p. 214–215.

11. Timothy Morton, *Realist Magic: Objects, Ontology, Causality* (Open Humanities Press, 2013).

12. Han, *The Scent of Time: A Philosophical Essay on the Art of Lingering*.

13. Antonin Artaud, *To Have Done With the Judgment of God*, Radio play, 1947; Gilles Deleuze and Félix Guattari, *A Thousand Plateaus*, trans. Brian Massumi (University of Minnesota Press, 1987).

14. Timothy Morton, *Being Ecological* (The MIT Press, 2018), p. 42.

hierarchy, infuriating, rippling with illusion and strangeness."[15]

This enigmatic, dark reality described here we can call the *Irreverse*. Even Kant, who demanded the necessary submission of objects to the subject,[16] seemed to have sensed it with his notion of the 'sublime', while the Universe corresponds to an objectified 'Kingdom of Ends'. While the Universe is everything that we aim at decoding, charting and commanding, the Irreverse is the unconquerable realm that lies always more remote as we advance, the strange and unknown that grows as we look closer, the inexplicable and uncontrollable that escapes all regulative efforts. The Irreverse's pulsating existence beyond our apprehension is the engine behind the intellectual expansion of the Universe, the origin of true innovations apart from the mere reassembly of previously known building blocks. So should we fall for the old doctrine of "no ignorabimus",[17] as proclaimed 1900 by David Hilbert during his famous address to the International Congress of Mathematicians, and try to map the Irreverse, try to squeeze it into the rigor of science, incorporating it into our Universe and thus inflating it even more? Considering the nature of the Irreverse, this amounts to a task so colossal that it will easily overburden us, leaving us without any strategy to face important challenges. Slowly, the ecological dimension of these thoughts appears. Ecological awareness is the realization that "everything is relevant to everything else"[18] and clearly such a claim escapes our usual analytic techniques. So we need to find a form of co-existence with what we cannot calculate and control and a way to approach problems rationally but not necessarily scientifically. Acceptance of the Irreverse is a form of humility, acknowledging the very limited overall impact of humanity, while re-instantiating wonder and awe towards our imminent environment. This also means to live in peace with what we cannot reverse. With death as the archetype of irreversibility, this implies an acceptance of mortality. Current intensified research in life extension – usually with an elitist touch – on the other hand, is a clear symptom of still residing in the Universe. Comparable ambitions aim at reverting the ecological sins of our past. But those sins arose from a lack of understanding in the first place and even though our knowledge has been greatly expanded in the meantime, acknowledging the Irreverse shows the infeasibility of this aspiration. Yet, this should not imply a submission to finality, but a decisive renunciation of the policing of Nature. Instead, we need to adopt a calm and modest stance where living with and communicating with our environment becomes possible. Co-existence means the recognition of the existence of 'quasi-objects'[19] that are immensely richer than purely scientific

15. Morton, *Realist Magic: Objects, Ontology, Causality*, p. 55.

16. Gilles Deleuze, *Kant's Critical Philosophy: The Doctrine of the Faculties*, trans. Hugh Tomlinson and Barbara Habberjam (The Athlone Press, 1984).

17. David Hilbert, "Mathematical Problems: Lecture Delivered before the International Congress of Mathematicians at Paris in 1900," *Bulletin of the American Mathematical Society* 8 (1902): p. 445.

18. Morton, *Being Ecological*, p. 43.

19. Latour, *We Have Never Been Modern*.

objects. This concept tries to include the long and momentous traces that things took through history, eventually leading them far from human trajectories. This is close to a multinaturalism, also called perspectivism, the idea that we can be united with all forms of beings through an ecological culture, while it is our natural dispositions that make the difference.[20] So while our attitude towards the Universe is based on appropriation, the Irreverse can only be approached on an equal basis. Knowledge is then not gained in an objectifying manner but by entering a dialogue. So, in the end, what is the Irreverse? Maybe simply as it is stated of the workshop's website: "The Irreverse is the world we live in."

20. Eduardo Viveiros de Castro, "Exchanging Perspectives: The Transformation of Objects into Subjects in Amerindian Ontologies," *Common Knowledge* 10 (2004): 463–484.