Chapter Two

Information and Thinking

Michel Serres (translated by Joeri Visser)

Bacteria, fungus, whale, sequoia – we do not know any life of which we cannot say that it emits information, receives it, stores it and processes it. Four universal rules, so incontrovertible that, by them, we are tempted to define life but we are unable to do so because of the following counterexamples. Crystal and, indeed, rock, sea, planet, star, galaxy – we know no inert thing of which we cannot say that it emits, receives, stores and processes information. Four universal rules, so uniform that we are tempted to define anything in the world by them but are unable to do so because of the following counterexamples. Individuals, but also families, farms, villages, cities and nations – we do not know any human, alone or in groups, of whom we cannot say that they emit, receive, store and process information.

FOUR UNIVERSAL RULES

These four rules of information (defined, in turn, by its rarity) change the idea we have had of thinking and, likewise, the subject–object relationship. Because information circulates universally within and between the totality of all existing things, we really cannot say that we are as exceptional as we think we are. What is thinking, if not at least carrying out these four operations: receiving, emitting, storing and processing information like all existing things? There is no doubt that we do not really know that we think like the world because we have been separated from it – by a colossal temporal chasm of millions or thousands of years. There is no doubt that we do not really know that we think like the living because we have been separated from them by a colossal temporal chasm of millions or thousands of years.
Better yet, if thinking means inventing, what is left to say? Emitting information that becomes increasingly rare, increasingly controlled during the emission, increasingly independent from the reception, storage and process, increasingly removed from its balance. So dive into bifurcations, branches, yes, real inventions that emerge in the ‘grand narrative’ of the Universe or the Evolution of life.

By the way, what is a computer? A machine that emits, receives, stores and processes information, a strange machine with four universal rules – a universal machine, which functions as a thing of the world or as you and me.

**INFORMATION, SOMETHING NEW**

Common to everything that has had the chance to exist, information has nothing in common with what we call by that name; media channels overwhelm us every day with it. It is often reduced to dreary repetitions, ad nauseam, to announcements of corpses and disasters of power and death, while war and violence are ranked at the bottom of global causes of human deaths. The information that I am speaking of, instead, is closer to a rarity. Léon Brillouin defines it as the opposite of entropy, which is the characteristic of high energies. He even terms it ‘negentropy’.

At the same time that the Industrial Revolution, based on thermodynamic science, comes to an end, a concept from that same science, but contradicting entropy, takes the relay. Just as entropy, in fact, reigns the ‘hard’, so is information equivalent to what I call the ‘soft’.

By soft age, I would willingly comprehend a time in which we finally understand that the four rules that I have set forth govern, and they always have governed, and they without doubt forever will govern all that, being contingent, has the rare chance to exist. This information circulates in the world of things and between living things as well as between us – humans – and it constitutes the bedrock of thinking.

Information, in its everyday sense, contradicts that sense several times: the repetitions are opposed to its rarity, as the identical is opposed to the new and death to life. In the sense of information theory, the information of the media thus provides mostly no information. Inversely, thinking means inventing: getting hold of rarity, discovering the secret of that which has the huge and contingent chance to exist or to be born tomorrow – *natura*, nature, means that which will be born. Such a secret allows us to understand that inventing or discovering requires the same effort for a similar result since everything that exists, contingently, has a given quantity of rarity, that is to say, something new.
ANCIENT NETWORKS

Where does this information circulate? Basically, in networks. For a long time, I’ve been surprised by this recent form of circulation that is nonetheless quite ancient. The Roman roads already made one such information network, and a sizeable one, all around the Mediterranean, from Iran to Scotland, from the Danube to the Nile and to the Atlas Mountains. I would not be surprised if one day a specialist discovered the vague traces of comings and goings of our hunter-gatherer ancestors, depending on the seasons, fruits and game, before the agrarian settlement of the Neolithic period. For their part, ethnologists recognize the traces of various tribes in the Amazon rainforest whose marks reflect immemorial gaps, tied with ephemeral housings, through a forest allegedly known as ‘virgin’, though these identifiable passages reveal it to have been ‘cultivated’ and thus ‘cultural’ for a long time. From those distant moments and through ever-expanding spaces, we have continued to cover our landscapes and the portolans of the Silk Routes, of the Incas or of spices – of land, maritime, rail or air ways. We still decorate the planet with a web of hertz – an electronic web – with a thousand and one names, repeating, thereby, a hominid practice that is at least a thousand years and at most a million years old.

Even better, every life constructs itself from admirable networks whose number of paths and connections defies the combinatorial explosion and whose delicacy surprises us. Earth physics, or even chemistry, extracts refined details from it. These tangles bridge the hard sciences and the soft sciences, and the long duration of their form still distances them, a billion years from us. Nothing truly new under the sun, under the ‘yellow dwarf’ lost in the giant network of singularities known by astrophysicists.

MATTER AND INFORMATION

Information circulates through the inert, living and human world, where everything and everyone emits it, receives it, exchanges it, conserves it and processes it. Interactions are thus not only material, or hard, but they are also informational, or soft: interactions, for sure, of causes, forces and energies – but also interferences, interpretations and intersections of signs, codes, images, co-possibilities and filters.

Something powerfully new has emerged in our vision of the world: the universe is made up of matter and information, paired and without doubt inseparable. This means that all things express, in some way, other things and the world; all things conspire and consent to it. All things, in some way, perceive – see, write, read – just like us.
No, we are not so exceptional; we are not the only ones endowed with the capability to see, read or write: the wind traces its musical partition over the waves of the sea and the dunes of the desert; running water weaves rich branches of river-like arborescence; dust engraves cliffs that are already sculpted or drawn by erosion; by their distinctive style, earthquakes, fractures, hot spots, the low plate tectonics define the higher relief. The living leave their remains, be it only bones. Magnetism marks itself and remains etched on soft rock on its way to crystallization, indicating the time of its hardening; radioactivity counts time; the climate leaves traces in dust buried in the deep ice of the poles and the ice sheets; evolution deploys itself on organisms, more disparate than systemic. We are not the only ones endowed with the capability to count or remember; the trees calculate their years, crowned in their wood. Nor are we the only ones endowed with the capability to code; everything ultimately gets spelled out in the language of mathematics. I have already said that we think like the world; now I am saying that the world thinks like us.

The world, so here it is.

**THE CAVE STREAMED WITH LIGHT**

Dazzled with the light after so long a darkness … [the two heroes] thought at first they were the prey of some ecstatic illusion, so splendid and unexpected was the sight that greeted their eyes. They were in the center of an immense grotto. The ground was covered with fine sand bespangled with gold. The vault was as high as that of a Gothic cathedral, and stretched away out of sight into the distant darkness. The walls were covered with stalactites of varied hue and wondrous richness, and from them the light of the torches was reflected, flashing back with all the colors of the rainbow, with the glow of a furnace fire and the wealth of the aurora. Colors of the most dazzling, shapes the most extraordinary, dimensions the most unexpected, distinguished these innumerable crystals. They were not, as in most grottoes, pendants, monotonously similar to each other, but nature had given free scope to fancy, and seemed to have exhausted every combination of tint and effect to which the marvelous brilliancy of the rocks could lend itself.

Blocks of amethyst, walls of sardonyx, masses of rubies, needles of emeralds, colonnades of sapphires deep and slender as forest pines, bers of aquamarine, whorls of turquoise, mirrors of opal, masses of rose gypsum, and gold-veined lapis lazuli all that the crystal kingdom could offer that was precious and rare and bright and dazzling had served as the materials for this astonishing specimen of architecture; and, further, every form, even of the vegetable kingdom, seemed to have been laid under contribution in the wondrous work. Carpets of mineral mosses soft and velvety as