The Doctrine of Cycles

I

This doctrine (whose most recent inventor called it the doctrine of the Eternal Return) may be formulated in the following manner:

The number of all the atoms that compose the world is immense but finite, and as such only capable of a finite (though also immense) number of permutations. In an infinite stretch of time, the number of possible permutations must be run through, and the universe has to repeat itself. Once again you will be born from a belly, once again your skeleton will grow, once again this same page will reach your identical hands, once again you will follow the course of all the hours of your life until that of your incredible death. Such is the customary order of this argument, from its insipid preliminaries to its enormous and threatening outcome. It is commonly attributed to Nietzsche.

Before refuting it—an undertaking of which I do not know if I am capable—it may be advisable to conceive, even from afar, of the superhuman numbers it invokes. I shall begin with the atom. The diameter of a hydrogen atom has been calculated, with some margin of error, to be one hundred millionth of a centimeter. This dizzying tininess does not mean the atom is indivisible; on the contrary, Rutherford describes it with the image of a solar system, made up of a central nucleus and a spinning electron, one hundred thousand times smaller than the whole atom. Let us leave this nucleus and this electron aside, and conceive of a frugal universe composed of ten atoms. (This is obviously only a modest experimental universe; invisible, for even microscopes do not suspect it; imponderable, for no scale can place a value on it.) Let us postulate as well—still in accordance with Nietzsche's conjecture—that the number of possible changes in this universe is the number of ways in which the ten atoms can be arranged by varying the order in which they are placed. How many different states can this world

know before an eternal return? The investigation is simple: it suffices to multiply 1 x 2 x 3 x 4 x 5 x 6 x 7 x 8 x 9 x 10, a tedious operation that yields the figure of 3,628,800. If an almost infinitesimal particle of the universe is capable of such variety, we should lend little or no faith to any monotony in the cosmos. I have considered ten atoms; to obtain two grams of hydrogen, we would require more than a billion billion atoms. To make the computation of the possible changes in this couple of grams—in other words, to multiply a billion billion by each one of the whole numbers that precedes it—is already an operation that far surpasses my human patience.

I do not know if my reader is convinced; I am not. This chaste, painless squandering of enormous numbers undoubtedly yields the peculiar pleasure of all excesses, but the Recurrence remains more or less Eternal, though in the most remote terms. Nietzsche might reply: "Rutherford's spinning electrons are a novelty for me, as is the idea—scandalous to a philologist—that an atom can be divided. However, I never denied that the vicissitudes of matter were copious; I said only that they were not infinite." This plausible response from Friedrich Zarathustra obliges me to fall back on Georg Cantor and his heroic theory of sets.

Cantor destroys the foundation of Nietzsche's hypothesis. He asserts the perfect infinity of the number of points in the universe, and even in one meter of the universe, or a fraction of that meter. The operation of counting is, for him, nothing else than that of comparing two series. For example, if the first-born sons of all the houses of Egypt were killed by the Angel, except for those who lived in a house that had a red mark on the door, it is clear that as many sons were saved as there were red marks, and an enumeration of precisely how many of these there were does not matter. Here the quantity is indefinite; there are other groupings in which it is infinite. The set of natural numbers is infinite, but it is possible to demonstrate that, within it, there are as many odd numbers as even.

1	corresponds to	2
3	to	4
5	to	6, etc.

This proof is as irreproachable as it is banal, and is no different from the following proof that there are as many multiples of 3018 as there are numbers—without excluding from the latter set the number 3018 and its multiples.

1	corresponds to	3018
2	to	6036
3	to	9054
4	to	12072, etc.

The same can be affirmed of its exponential powers, however rarefied they become as we progress.

1	corresponds to	3018
2	to	3018^2 which is 9,108,324
3	to	etc.

A jocose acceptance of these facts has inspired the formula that an infinite collection—for example, the natural series of whole numbers—is a collection whose members can in turn be broken down into infinite series. (Or rather, to avoid any ambiguity: an infinite whole is a whole that can be the equivalent of one of its subsets.) The part, in these elevated numerical latitudes, is no less copious than the whole: the precise quantity of points in the universe is the same as the quantity of points in a meter, or a decimeter, or the deepest trajectory of a star. The series of natural numbers is very orderly, that is, the terms that form it are consecutive: 28 precedes 29 and follows 27. The series of points in space (or of instants in time) cannot be ordered in the same way: no number has a successor or an immediate predecessor. It is like a series of fractions arranged in order of magnitude. What number will we count after ½? Not $^{51}/_{100}$, because $^{101}/_{200}$ is closer; not $^{101}/_{200}$, because $^{201}/_{400}$ is closer; not $^{201}/_{400}$, because . . . According to Cantor, the same thing happens with points. We can always interpose more of them, in infinite number. Therefore we must try not to conceive of decreasing sizes. Each point is "already" the final degree of an infinite subdivision.

The clash between Cantor's lovely game and Zarathustra's lovely game is fatal to Zarathustra. If the universe consists of an infinite number of terms, it is rigorously capable of an infinite number of combinations—and the need for a Recurrence is done away with. There remains its mere possibility, which can be calculated as zero.

II

Nietzsche writes, in the autumn of 1883: "This slow spider dragging itself towards the light of the moon and that same moonlight, and you and I

whispering at the gateway, whispering of eternal things, haven't we already coincided in the past? And won't we happen again on the long road, on this long tremulous road, won't we recur eternally? This was how I spoke, and in an ever lower voice, because my thoughts and what was beyond my thoughts made me afraid." Writes Eudemus, a paraphraser of Aristotle, three centuries or so before the Cross: "If the Pythagoreans are to be believed, the same things will return at precisely their time and you will be with me again and I will repeat this doctrine and my hand will play with this staff, and so on." In the Stoic cosmogony, "Zeus feeds on the world": the universe is cyclically consumed by the fire that engendered it, and resurges from annihilation to repeat an identical history. Once again the diverse seminal particles combine, once again they give form to stones, trees, and men—and even virtues and days, since for the Greeks a substantive number was impossible without some corporeality. Once again every sword and every hero, once again every minutious night of insomnia.

Like the other conjectures of the school of the Porch, that of a general repetition spread across time entered the Gospels (Acts of the Apostles 3:21), along with its technical name, *apokatastasis*, though with indeterminate intent. Book XII of St. Augustine's *Civitas Dei* dedicates several chapters to the refutation of so abominable a doctrine. Those chapters (which I have before me now) are far too intricate for summary, but their author's episcopal fury seems to fix upon two arguments: one, the gaudy futility of this wheel; the other, the ridiculousness of the Logos dying on the cross like an acrobat in an interminable sequence of performances. Farewells and suicides lose their dignity if repeated too often; St. Augustine must have thought the same of the Crucifixion. Hence his scandalized rejection of the viewpoint of the Stoics and Pythagoreans, who argued that God's science cannot understand infinite things and that the eternal rotation of the world's process serves to allow God to learn more and familiarize Himself with it. St. Augustine mocks their worthless revolutions and affirms that Jesus is the straight path that allows us to flee from the circular labyrinth of such deceptions.

In the chapter of his *Logic* that addresses the law of causality, John Stuart Mill maintains that a periodic repetition of history is conceivable—but not true—and cites Virgil's "Messianic eclogue":

> *Iam redit et virgo, redeunt Saturnia regna*
> [Now the Maiden returns, the reign of Saturn returns]

Can Nietzsche, the Hellenist, have been ignorant of these "precursors"? Was Nietzsche, author of the fragments on the pre-Socratics, perhaps unaware of a doctrine learned by the disciples of Pythagoras?[1] This is hard to believe—*and futile.* True, Nietzsche has indicated, in a memorable page, the precise spot on which the idea of the Eternal Return visited him: a path in the woods of Silvaplana, near a vast pyramidal block, one midday in August 1881—"six thousand feet beyond men and time." True, this instant is one of Nietzsche's great distinctions. "Immortal the instant in which I engendered the eternal recurrence. For that instant I endure the Recurrence," were the words he would leave (*Unschuld des Werdens* II, 1308). Yet, in my opinion, we need not postulate a startling ignorance, nor a human, all too human, confusion between inspiration and memory, nor a crime of vanity. My key to this mystery is grammatical, almost syntactical. Nietzsche knew that the Eternal Recourse is one of the fables, fears, diversions, that eternally recur, but he also knew that the most effective of the grammatical persons is the first. Indeed, we would be justified in saying that, for a prophet, the only grammatical person is the first. It was not possible for Zarathustra to derive his revelation from a philosophical compendium or from the *Historia philosophiae graeco-romanae* of the surrogate professors Ritter and Preller, for reasons of voice and anachronism, not to speak of typography. The prophetic style does not allow for the use of quotation marks nor the erudite attestation of books and authors. . . .

If my human flesh can assimilate the brute flesh of a sheep, who can prevent the human mind from assimilating human mental states? Because he rethought it at great length, and endured it, the eternal recurrence of things is now Nietzsche's and does not belong to some dead man who is barely more than a Greek name. I will not insist; Miguel de Unamuno already has his page on the adoption of thoughts.

Nietzsche wanted men who were capable of enduring immortality. I say this in words that appear in his personal notebooks, the *Nachlass*, where he also inscribed these others: "If you envision a long peace before you are reborn, I swear to you that you are thinking wrongly. Between the final instant of consciousness and the first gleam of a new life there is 'no time'—the lapse lasts as long as a bolt of lightning, though billions of years are insufficient to measure it. If a self is absent, infinity can be the equivalent of succession."

[1] This perplexity is futile. Nietzsche, in 1874, jeered at the Pythagorean thesis that history repeats itself cyclically (*Vom Nutzen und Nachteil der Historie*). (Note added in 1953.)

Before Nietzsche, personal immortality was no more than a blundering hope, a hazy plan. Nietzsche postulates it as a duty and gives it all the ghastly lucidity of insomnia. "Waking, by reason of their continual cares, fears, sorrows, dry brains," (I read in Robert Burton's antique treatise) "is a symptom that much crucifies melancholy men." We are told that Nietzsche endured this crucifixion and had to seek deliverance in the bitterness of chloral hydrate. Nietzsche wanted to be Walt Whitman; he wanted to fall minutely in love with his destiny. He adopted a heroic method: he disinterred the intolerable Greek hypothesis of eternal repetition, and he contrived to make this mental nightmare an occasion for jubilation. He sought out the most horrible idea in the universe and offered it up to mankind's delectation. The languid optimist often imagines himself to be a Nietzschean; Nietzsche confronts him with the circles of the eternal recurrence and spits him out of his mouth.

Nietzsche wrote: "Not to yearn for distant ventures and favors and blessings, but to live in such a way that we wish to come back and live again, and so on throughout eternity." Mauthner objects that to attribute the slightest moral, in other words practical, influence to the hypothesis of eternal return is to negate the hypothesis—since it is comparable to imagining that something can happen in another way. Nietzsche would answer that the formulation of the eternal return and its extensive moral (in other words, practical) influence and Mauthner's cavils and his refutation of Mauthner's cavils are naught but a few more necessary moments in the history of the world, the work of atomic agitations. He could, with reason, repeat the words he had already written: "It suffices that the doctrine of circular repetition be probable or possible. The image of a mere possibility can shatter and remake us. How much has been accomplished by the possibility of eternal damnation!" And in another passage: "The instant that this idea presents itself, all colors are different—and there is another history."

III

At one time or another, the sensation of "having lived this moment already" has left us all pensive. Partisans of the eternal recurrence swear to us that it is so and investigate a possible corroboration of their faith in these perplexed states of mind. They forget that memory would import a novelty that negates the hypothesis, and that time would gradually perfect that memory until the distant heaven in which the individual now foresees his

destiny and prefers to act in another way. . . . In any case, Nietzsche never spoke of a mnemonic confirmation of the Recurrence.[2]

Nor—and this deserves to be emphasized as well—did he speak of the finiteness of atoms. Nietzsche *negates* the atom; atomic theory seemed to him nothing but a model of the world made exclusively for the eyes and the mathematical mind. . . . To ground his hypothesis, he spoke of a limited force, evolving in infinite time, but incapable of an unlimited number of variations. His procedure was not without perfidy: first he sets us on guard against the idea of an infinite force—"let us beware such orgies of thought!"—and then he generously concedes that time is infinite. Similarly, it pleases him to fall back on the Prior Eternity. For example: an equilibrium of cosmic forces is impossible, since if it were not it would already have occurred in the Prior Eternity. Or: universal history has happened an infinite number of times—in the Prior Eternity. The invocation seems valid, but it should be repeated that this Prior Eternity (or *aeternitas a parte ante,* as the theologians would call it) is nothing but our natural incapacity to conceive of a beginning to time. We suffer the same incapacity where space is concerned, so that invoking a Prior Eternity is as decisive as invoking the Infinity To My Right. In other words, if time is infinite to our intuition, so is space. This Prior Eternity has nothing to do with the real time that has elapsed; we go back to the first second and note that it requires a predecessor, and that that predecessor requires one as well, and so on infinitely. To close off this *regressus in infinitum* [regression into infinity], St. Augustine declares that the first second of time coincides with the first second of the Creation: "*non in tempore sed cum tempore incepit creatio*" [The Creation begins not in time but with time].

Nietzsche appeals to energy; the second law of thermodynamics declares that some energetic processes are irreversible. Heat and light are no

[2]Of this apparent confirmation, Néstor Ibarra writes: "It also happens that some new perception strikes us as a memory, and we believe we recognize objects or accidents that we are nevertheless sure of meeting for the first time. I imagine that this must have to do with a curious operation of our memory. An initial perception, any perception, takes place, but *beneath the threshold of consciousness.* An instant later, the stimulus acts, but this time we receive it *in our conscious mind.* Our memory comes into play and offers us the feeling of *déjà vu,* but situates the recollection wrongly. To justify its weakness and its disturbing quality, we imagine that a considerable amount of time has passed, or we may even send it further, into the repetition of some former life. In reality it is an immediate past, and the abyss that separates us from it is that of our own distraction."

more than forms of energy. It suffices to project a light onto a black surface to convert it into heat. Heat, however, will never return to the form of light. This inoffensive or insipid-seeming proof annuls the "circular labyrinth" of the Eternal Return.

The first law of thermodynamics declares that the energy of the universe is constant; the second, that this energy tends toward isolation and disorder, though its total quantity does not decrease. This gradual disintegration of the forces that make up the universe is entropy. Once maximum entropy is reached, once different temperatures have been equalized, once any action of one body on another has been neutralized (or compensated for), the world will be a random assemblage of atoms. In the deep center of the stars, this difficult, mortal equilibrium has been achieved. By dint of constant interchange, the whole universe will reach it, and will be warm and dead.

Light is gradually lost in the form of heat; the universe, minute by minute, is becoming invisible. It grows more inconstant, as well. At some point, it will no longer be anything but heat: an equilibrium of immobile, evenly distributed heat. Then it will have died.

A final uncertainty, this one of a metaphysical order. If Zarathustra's hypothesis is accepted, I do not fully understand how two identical processes keep from agglomerating into one. Is mere succession, verified by no one, enough? Without a special archangel to keep track, what does it mean that we are going through the thirteen thousand five hundred and fourteenth cycle and not the first in the series or number three hundred twenty-two to the two thousandth power? Nothing, in practice—which is no impairment to the thinker. Nothing, for the intellect—which is serious indeed.

[1936] *[EA]*

Among the books consulted for the foregoing article, I must make mention of the following:

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