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Crisis as Choice: from the Problem to the Question

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Introduction: Crisis as a Scientific Problem

What does the word “crisis” mean? “Crisis” comes from the verb *krino* which means “to divide”, “to choose”, “to decide”, and it indicates a moment of suspension, a “critical threshold” from which the need for a choice emerges. This is an etymological answer to a question of semantic nature. But etymology can’t be the only path to follow. The meaning of a word is not a “ghost” that always accompanies it. In different contexts, the meaning changes. Instead of asking *what* “crisis” means, we must therefore ask ourselves 1) *how* this word is mostly used today, and 2) *how* we choose to use it. We must find synonyms and antonyms. A good synonym for the word “crisis” seems nowadays to be the word “problem”: crisis is a problem to be solved through a “solution”. If we mean crisis as a *problem*, then crisis itself loses the

meaning of choice, and takes on the meaning of a search, the search for the solution of the problem.

This is what we'll call the "technical-scientific approach". This approach is not only specific to the purely scientific disciplines. Every time we speak of crisis, either political, institutional, economic, financial, but even personal, we unconsciously take a technical-scientific attitude, which might limit our ability to radically think about the crisis itself. Yet, even before we raise questions on the crisis, we should think about how we usually face the crisis as a problem. In order to do so we will consider some critical turning points in the past and present research in physics. And we will clarify what crisis means in science.

In science we speak of crisis when a successful scientific theory is faced with a new natural phenomenon, which appears to be unexplainable by the laws defined by such theory. The phenomenon is "new" just because it was not foreseeable by the law. Therefore, the theory's prediction power is undermined. And that means that the theory is facing a serious problem, for theory *is* prediction. Its very nature doesn't allow it to exit the logic of prediction. A scientific theory sees the crisis as a problem, and naturally predicts a solution.

This is the case of the search for the "Higgs boson", currently undertaken at the CERN laboratories in Geneva. This search is based on the prediction of the existence of a new, not yet discovered particle capable of saving the current particle physics theory, and therefore resolving a decade-long crisis.

The Standard Model's Crisis and Other Scientific Revolutions

The crisis became manifest in 1983, when, in the same laboratories where now a solution is sought, two very large mass particles were discovered: the W and Z bosons. The very presence of these particles made clear the insufficiency of the current theory, the *Standard Model*, which seemed to work only in a world inhabited by mass-less, ghostly particles. Yet the Standard Model had proven to be one of the most successful theories elaborated by mankind. Its predictions were confirmed by experiments with unrivaled precision in the microscopic world. But this “language” was unable to include mass in its calculations, and was therefore unable to describe most of our everyday life. In a broad sense, it was incapable to explain the punch, the applause, the hug. Physicists thought that for such a successful theory describing the microscopical, mass-less world, the inclusion of mass would have been a simple, natural extension. It was unexpected to find so many difficulties.

This crisis in prediction triggered a new prediction: the inability to describe the W and Z particles’ masses brought the prediction of a new particle: the Higgs boson. The Higgs boson is a wholly new particle, which interacts with existing particles in an anomalous way. But when inserted in the equations, it allowed for the inclusion of mass, thus saving the theory.

The crisis is seen as an internal problem of the theory, which can be solved by the theory itself. The search for a solution is the first, almost primordial, reaction of the theory when it faces a problem. It is willing to undergo severe modifications in order to guarantee its survival. This is how most scientific revolutions have taken place, such as the birth of quantum mechanics. At the beginning of the past century, the scientific community was facing an opposite problem: classical Galilean-Newtonian

mechanics were very successful in describing the macroscopic world, i. e. the motion of cannonballs and the orbits of the planets, but was incapable of understanding light. The beginning of the crisis of classical mechanics can be recognized in the discovery of the unexpected, ambivalent nature of light, which seemed to behave as a particle *and* as a wave at the same time.

Light played the same role, which the W and Z particles would have many years to come. Our understanding of nature was revolutionized: the new theory of light proposed by Einstein led to the birth of quantum mechanics. Though classical mechanics were not completely discarded, it was simply limited in its validity: it still remains a precise approximation for the description of macroscopic objects, but the range of the new physical theory, quantum mechanics, was now extended to the microscopic realm. Classical mechanics became a subset of physics.

But the birth of Galilean-Newtonian theory stemmed from a crisis as well. A much more radical one, which led not only to the redefinition of the range of validity of the previous theory, but to its drastic demise. We are talking about the crisis of Ptolemaic geocentricism. Once again, the crisis was triggered by an unexpected observation: around 1610 Galilei pointed a telescope to the sky and saw that Venus, just like the Moon, has phases. This phenomenon was not explainable in the Ptolemaic system, because it is the proof that Venus orbits around the Sun. This observation marked the end of another decade-long debate. That was the end and the solution of a deep crisis.

Ptolemaic geocentricism had already started to tremble in 1543, when Copernicus published his *De revolutionibus orbium coelestium*. The weakest aspect of Ptolemaic

geocentricism was the explanation of the retrograde motion of planets. When observed from Earth, indeed, other planets sometimes apparently slow down in their orbit, stop, and move backwards. In the heliocentric model the explanation of such a phenomenon is extremely simple: it is due to the moving reference the Earth is in. On the contrary, in the Ptolemaic system you have to introduce several geometrical complications, such as epicycles and deferents, in order to describe it.

A compromising solution was found by Tycho Brahe, the most influential astronomer of the time: he kept the accepted geocentric model, in which the Earth is fixed in the center of the Universe and the Sun is revolving around it, but he made the other planets revolve around the Sun with circular orbits, as in Copernicus' model. However, both the epicycles and Brahe's compromise were deemed to fall down together with geocentricism. Both were attempts to save the theory from phenomena it had not expected, and was not able to predict.

The Crisis of the Scientific Dialectic of "Problem and Solution"

A crisis is opened for a scientific theory when an unexpected observation is made: this was the case of the phases of Venus for Ptolemaic geocentricism, of the nature of light for classical mechanics, and of Standard Model's inability to describe mass, that became manifestly insufficient when the W and Z particles were discovered. New discoveries determine the crisis for a theory and bring it to a critical threshold. In the case of the Ptolemaic model, geocentricism was sacked. The birth of quantum mechanics had the effect of limiting the validity of classical physics. In the case of the Standard Model the outcome is not defined yet: if the Higgs boson is found the theory can still be saved.

These are very different historical turning points, but there exists a structural analogy linking them. In each case the crisis is seen as a ‘problem’. The solution to the problem may not be found, but it is systematically envisaged. It’s the very essence of the theory, we can say its “immune system,” that almost automatically ignites this mechanism: it tries to solve the problem within its very own reference frame, within the range of validity of its model. Even when a model is abandoned, the crisis finds its solution: a new model. And this new model is also doomed to face new problems and to react in the same way. Crises never stop the scientific dialectic of problem and solution. Science *per se* never reaches a critical threshold. With a technical-scientific approach we will always face a crisis in the same way: as a problem. Let’s try to raise the question of the crisis, to look at the crisis as a question. It’s not a matter of finding an answer, it’s a matter of choice. The choice of evading from the problem-solution dialectic. The question itself is therefore the crisis of the scientific dialectic.

In the late ’30s, the philosopher Martin Heidegger indicates very clearly the difference and the intimacy between “problem” and “question”:

‘Problems’ – the word in quotation marks serves to name questions that are no longer truly asked. They have been frozen as questions, and it is only a matter of finding the answer [...]. Such ‘problems’ are therefore particularly prone to conceal genuine questions and to dismiss out of hand, as too strange, certain questions that have never yet been raised, indeed to misinterpret completely the essence of questioning. [...]

Under the impressive appearance of ‘problems’ they may summarily and decisively prevent real questioning.¹

This statement becomes clearer if we consider how Heidegger raises *The Question Concerning Technology* in the early 50's. It is still an essential setting to understand the contemporary world. Its basic feature is the recognition of the pervasiveness of the technical-scientific attitude and its indisputable authority, which is constantly confirmed by the successes that technology itself regularly offers to our eyes. This attitude and its unquestionability don't state only the scientific disciplines in a strict sense, but they rather cover "all organizational forms of modern life: industry, commerce, education, politics, warfare, journalism of all kind. To be acquainted with this intersecting is important".²

Concluding Remarks

Life itself is today divided into areas and sectors that are studied by their respective "theories". These can look very different, but they are also dominated by the same attitude. Although it may seem reductive compared to our days' complexity, Heidegger's analysis of technology makes it possible to discern the distinctive trait of apparently very distant areas such as physics, law, history, psychology, politics, journalism, economy and finance.

This common feature is a way of thinking, based on the model of reckoning, which freezes and prevents "real questioning", and – we can say – real choosing as well. The first consequence of this pervasiveness or "intersection" is indeed that all spheres of "organized life" take on the main limit of every theory. We can indicate this limit as a constitutive deficiency of self-understanding. This way the scientific method is not discredited. Heidegger only states that "If we want to assert something about mathematics as theory, then we must leave behind the object-area of mathematics

together with mathematics' own way of representing. We can never discover through mathematical reckoning what mathematics itself is."³

And this works for all theories. Due to this, calculation inhibits the chance of questioning: a "truly asked question" is in Heidegger's opinion a question which affects not only the object of questioning, but the questioning itself; it is not only related to a problem which can be solved in a reference frame, but it calls into question the reference frame itself. The reference frame can be called into question only through its suspension, only through its crisis. But the crisis must be radically thought. Then we should raise the question: can the crisis of a reference frame be radically thought, if it is seen as a problem to solve with the resources offered by the reference frame itself?

We need to ask this kind of question every time we talk about a "crisis" in one of the "organizational forms of modern life". If the technical-scientific way of dealing with crisis is pursued, then crisis itself doesn't affect the technical-scientific way to solve problems. It "goes its way more securely than ever before."⁴

¹ M. Heidegger, *Basic Questions of Philosophy. Selected "Problems" of "Logic"*, translated by R. Rojcewicz and A. Schuwer (Bloomington & Indianapolis: Indiana University Press, 1994), 8.

² M. Heidegger, *The Question concerning Technology and Other Essays*, translated by W. Lovitt (New York & London: Garland Publishing, 1977), 157.

³ Heidegger, *The Question concerning Technology and Other Essays*, 177.

⁴ Heidegger, *The Question concerning Technology and Other Essays*, 178.