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Meaning and Science in Weimar
Crisis and the Cultural Foundations of Reason

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Introduction

This essay surveys a number of intellectual currents in and about the Weimar Republic (1919-33), and attempts to provide a limited background for understanding the codeterminacy of scientific, cultural, and socio-political crisis. It will not argue from the standpoint of any kind of historical determinism in which one range of events or ideas would be the first and final cause of another. Such a project has neither theoretical viability nor empirical credibility. It will rather attempt to map out the contours of a constellation of cultural elements around the *concept* of crisis in order to penetrate the semiotic function of both the concept and the period in which it is so passionately meaningful. This involves both a thematization of the concept of crisis with respect to a number of cultural artifacts and the analysis of a number of assertions about the nature of an alleged crisis. In what follows I cannot hope to provide any kind of empirical demonstration of continuity between historical or cultural crisis and the crisis of rationality that is the primary object of this essay. However I will try, as far as possible, to root out the general consequences of the etymologically classical sense of the term "crisis"

(gr. *kreinon*), which means at once division and decision, judgment, choice, measure, strife, battle.[1]

From this point of departure it is useful to begin with the term "crisis" in its originally operative *juridical* sense, associated with legality, legitimacy, governing and citizenship in the Hellenistic period. The term's contemporary application grew out of this analytic notion, through a mutation introduced by the temporization implicit in Christian theology and the Christian eschatological world-view, and assuring a situation of reality and value that is not yet in place, but rather potential, Christian theology turns attention towards non-presence, towards what is not but shall be. Thereby the notion of *historical* crisis becomes the dominant mode of the concept. The "decision" or "judgment" in its juridical sense becomes involved in an attitude about the present based on something non-present, be it the unrealized but realizable future, or, inversely, the unworthiness of the present with respect to a non-present, and non-recoverable past. This teleological theme is fully developed in the Idealist and Romantic historical theories of 18th and 19th centuries, and in modern ideologies of progress in general. As we will see, these traditions will be central in the make-up of the Weimar Republic. The conception of crisis as moment of historical decision, as a turning point in time, also opens the 20th century obsession with decline, eclipse and apocalypse. Crisis is henceforth understood as both a moment in a general movement of "progress", a surpassing of some prior state of society, culture, politics, material being, or even knowledge in a gesture of continuity, and as a radical break, expulsion or purification of the priori state. Crisis is thus the name of a productive paradox: it is both continuity and rupture. It is the generative dialectic of that paradox. In other words, it is a constant demonstration of the continuity in any rupture, and the implicit rupture that is necessary to understand historical continuity at all.

Our axes of research will be four crises surrounding the rise and fall of the Weimar Republic, one of the most tormented and paradoxical peacetime periods in modern European history. The first tension revolves around the very existence of the Republic, its status as a bearer of culture and meaning for the German people, and its viability as the fundamental bulwark for the organization of a traditionally class-based culture. The second crisis is the revolution which rattles the very foundations of the natural sciences in general,

[1] Reinhart Koselleck. "Krise", *Historisches W_rterbuch der Philosophie*, pp. 1236-40. Reinhart Koselleck, "Krise", *Geschichtliche Grundbegriffe. Historisches Lexikon zur politisch-sozialen Sprache in Deutschland*. Otto Brunner, Werner Conze, Reinhart Koselleck (Hsgbr.). Band 3. Stuttgart. Klett-Cotta, 1983, pp. 617-50.

and physics and mathematics in general. These two fields, traditionally understood as the guarantors of the validity of Everyman's understanding of reality find themselves profoundly shaken in the last years of the century. These traditional affirmations of the legitimacy of common sense perceptions suffer uncanny theoretical blows around the turn of the century, and veer radically from their well-established paths. The third crisis closely follows the trepidation of the second. The problematization of the utility and validity of the natural sciences in producing meaningful statements about humanity casts light on the very notion of meaningfulness, and leads inevitably to the formation of an entirely new scientific discourse: the modern human sciences. Fourthly, we will open the angle of our approach to focus on Edmund Husserl, the founder of modern phenomenology, in an attempt to situate his historical approach to the crisis of the "European Sciences" in the Weimar *Kulturkampf*, and to connect his relationship to the three previous axes of crisis. I will thereby suggest a number of socio-political consequences of the forceful analysis of his later writings and, in particular, in his last major work *The Crisis of the European Sciences and Transcendental Philosophy* (1935).

1. Crisis as Historical Specificity

1.1. The Cultural Crisis of the Weimar Republic

Though Germany was driven to unconditional capitulation in the autumn of 1918, the story of the final moments of World War I is one of a continent in a state of exhaustion. Everywhere and on all levels, European culture showed itself to be at the end of its civilizational resources. A war which was to have last only several months had drawn brutally and bloodily on for four years. Belief in the decisiveness of modern warfare had lead the three power blocks to enter into conflict defining neither their objectives nor the limits to which they were prepared to go before yielding in the face of resistance. The complex constellation of European actors created cross-firing conflicts with unclear or even irrational ambitions, without mechanisms of control, and handicapped by inconsequential political coordination.[2] At the same time, the final months of the war in the autumn of 1918 were marked by numerous declarations of national sovereignty and the formation of hitherto unknown states. Czechoslovakia, Yugoslavia, Hungary, and the West Ukrainian Republic, for example, were

all declared in the course of four days. The assertion of national particularity combined with mass desertions and general chaos, consigned the initiatives which opened the war to oblivion, and pointed up the irrelevance of countless war enterprises. Indeed it was Germany that was forced to unconditional capitulation; but that capitulation was made in the face of evident lack of will on the European continent to continue a war without reason.

The first four years of the Weimar Republic, declared in 1926, were marked by constant internal conflict approaching civil war. The notion of unified national consensus was invisible until the dissolution of parliament in July 1930 by the Brüning government, after which a more a systematic attempt was made to assemble and unify all the non-center parties into either larger parties or large coalitions. The result of the streamlining was monumental and clearly changed the national trajectory: not the least the NSDAP, Hitler's until then relatively marginalized party, went from 12 to 107 representatives.[3]

In his cultural history of the Weimar Republic, Peter Gay maps out the corresponding *cultural* disunity, evoking the notion of Weimar as a *double* political entity, "the Germany of military swagger, abject submission to authority, aggressive foreign adventure, and obsessive pre-occupation with form, and the Germany of lyric poetry, Humanist philosophy, and pacific cosmopolitanism".[4] Gay's thesis is that, with the realization that the *Realpolitik* of Bismarck and Schlieffen had only lead to catastrophe for Germany and that another approach had to be attempted. For some, the answers to the question "whither Germany" is: toward the past. The innovation of Weimar is retrospection. The difficult question is "which past?" What elements of the German past are usable toward the creation of a "new" (old) Germany? Which are acceptable or even legitimate? In what sense can the past constitute a building block of the future? What is the roll of historical *continuity* in the delicate balance of rejection and rehabilitation of the past?

Thus the questions involved in the constitution of a political and historical continuity at the end of the First World War, and in the construction of a "new" constitutional republic correspond to a large degree to the notion of crisis as we have defined it above: the self-constitution or self-conceptualization of any thinkable entity is always a *crisis*. It is always a struggle between the mandate of novelty combined with the unavoidability of

[2] Norman Davies, *Europe. A History*. London. Oxford University Press, pp. 901-10.

[3] Hajo Holborn, *Deutsche Geschichte der Neuzeit. Band III: Das Zeitalter des Imperialismus (1871-1945)*. Fischer Taschenbuch Verlag, 1981, p. 461; Karl Dietrich Erdmann. *Die Weimarer Republik*. Stuttgart. Klepp Verlag, 1973, pp. 275-6. Horst Möller. *Weimar. Die unvollendete Demokratie*. München. Deutscher Taschenbuch Verlag, pp. 186-88.

[4] Peter Gay. *Weimar Culture. The Insider as Outsider*. London. Penguin Books, 1969, p. 1.

utilizing the building blocks—memories, culture, structures and institutions—imported or derived from the past. By all accounts imperial Germany was a consummate failure. It was politically, if not morally, impossible to relocate the axis of the new Germany along the lines of Wilhelmian values and policies. At the same time, the notion that there existed a "better" foundation for the new Germany, presupposes not only that *something* is retrievable from the past, and that that past is *also* German. In other words, the logic of the new beginning and cultural rejuvenation requires a reaffirmation that the new is not completely new, that the *new* is actually somehow *old*, and that the *old* is largely relevant as the *new*.

Virtually all the dominant minds of the Weimar Republic, be it intellectuals, business people or politicians, had been educated and developed culturally during the period prior to the War. Their *Weltanschauung* was based on a value system that was more or less estranged from the present. Their influence derived its weight from its appeal to a system of legitimacy and authority foreign to the norms and values of the new age.[5] In this regard, the culture of Weimar is marked by its lack of unity, by its double identity, and by the rupture in its conceptions of historical meaning and value. Art, literature, music, architecture, philosophy all straddle historical systems of reference and value orientation. All were partly foreign, partly domestic, proper to a new era, and proper to an old one. This is the sense of Gay's subtitle "the outsider as insider".

Parallel to the axis of the old and the new, cultural expression was often understood along the axis of nationalism—anti-natioanlism understood as identical to the axis republicanism—anti-republicanism. Thus the expressionist movements of the period immediately before the War were scorned by cultural conservatives. The modern architecture and design of the Bauhaus group (Gropius, Behrens, Mendelssohn, Mies van der Rohe), established before the war, also fell in cultural political disfavor among those who sought a national cultural expression, against the universalizing and a-historical references of modern expression. Modernist writers like Rilke and Cleats struggled with the demand for a certain wholeness, for coherence and systematic social, spiritual, cultural totality, and the need to draw upon the myths and legends of a particularly German past, and to distance themselves from the a-historical tendencies of the new democratic republicanism.[6]

The most prominent illustration of Weimar cultural schizophrenia is the case of Thomas Mann, whose famous public date with his older brother Heinrich and subsequent

[5] Holborn, p. 441.

[6] Gay, p. 67.

"conversion" to democracy serves as a model of the deep contradictions in virtually any attempt to form a systematic approach to cultural-political reconstruction. The point of departure of his *Observations of an Unpolitical Man* (published in 1918), begun during the first years of the War, is radically different from the position that Mann assumes in the 1920's, during the years preceding the proclamation of the Weimar Republic.[7] As Mann himself admonishes in 1920, "The *Observations* was thus a polemic pamphlet, but indeed also a passionate piece of work of self-research and of revision of my foundations. but self-research is still mostly the first step in a change, and I learned that no one remains where he was, when he learns to know himself... In short, the *democratic* confession was on the tip of my tongue and insisting to be expressed. I thank my guardian angel that I did not hold it back".[8] Republicanism was, to borrow a modern expression, "politically correct". It was a concept, in other words, with its own political rewards and sanctions.

On the political landscape, the tension between imperial traces of the Wilhelmian empire and the rationality of democratic republicanism also created the need for sociological, political, and scientific analysis that lead forth to some of the greatest works of history and politics of this century. Weimar culture is in many ways a paradigm for culture understood as change and creativity. Deeply troubled, it offered apparently unparalleled conditions for productivity. On the one hand, the four years of the Republic consist of one single civil war—there was a renaissance of the military elements of state administration, political assassination, inflation, the catastrophic Versailles Treaty, the Kapp Putsch, the French occupation of the Ruhr, and the tenacity of the association between the industrial complex and the aristocratic elements of society. Not only Germany, but also the entire Western World experienced the memory of WW I as psychosis that went far beyond simple demoralization.[9] Indeed its fissures and troubles present themselves as the very preconditions of cultural creation.

Academic institutions suffered the same tensions as the open cultural life. However, though the large majority of prominent writers tended to be liberal in their relationship to the Republic and its past, intellectuals holding posts in the academic institutions represented the hotbed of conservatism.[10] The republican governments of the Länder, which controlled and administered the public universities took little initiative toward

[7] Erdmann, pp. 245-6.
[8] Thomas Mann. "Kultur und Politik", *Betrachtungen eines Unpolitischen. Gesammelte Werke in Dreizehn Bänden*, Band 12. Stuttgart. Fischer Taschenbuch Verlag, 1990. p. 853.
[9] Gay, p. 12.

carrying out republican reform within the walls of the academy. Most of the universities were dominated conservative scholars who were by and large opposed to reform. Thus little or nothing was attempted in the name of strengthening the ideology of the "entire man" nor toward a limiting of the class based hierarchies that had traditionally been the bulwark of the faculties. Indeed it was the very democratic ideals which impeded principled reform."

1.2. The Crisis in the Natural Sciences

Crisis does not spring forth like a Big Bang from the emptiness of cosmic nothingness. It is a link in a chain of historical self-representations. It is mode of transition and of tradition, a mode of understanding ourselves in time, with respect to others who came before, with their concomitant bumbling and brilliance, and of our own conception of our place in the future. Creation, be it scientific our artistic, is a struggle within this temporal coliseum. For the "new scientists" of the 16th century, the situation was no different, indeed they have become, thanks to Husserl and others, the model for model-breaking: The background to our story of crisis in the first decades of the 20th century is the crisis which opened modernity in the 17th century.

The revolution in the scientific universe is prepared by revolution in virtually all other domains of human existence. The rise of "modern" political thought accompanies the decline of the Catholic Church as the institutional equivalent of the World, and the rise of the notion of the modern state, thereafter the nation-state, as the central axis of relation between human beings and their social surroundings. The multiplicity of cultures and the decline of the Latin language mark the growing legitimization of cultural particularity.

In the history of science, Modernity begins as the reconsideration of the scientific methodology of Antiquity. The key to the catastrophic reopening of the Greek mathematical and physical ideals, is not a theoretical but a pragmatic one. For it is a question of which tasks may be asked of mathematics and physics in particular, and the natural sciences in general. That radically new and virtually unthinkable aspect which inaugurates Modernity is therefore neither a revolutionary theory, nor newly discovered empirical material. It is a mutation in the field of application of the dominating scientific model.

[10] Holborn, p. 443.
[11] Holborn, p. 443.

On the other hand, during the last years of the 19th century and the early decades of the 20th a breathtaking decline in a singular form of modern self-understanding accelerates towards oblivion. The hard-won scientific orthodoxy of five centuries is shaken and begins to crumble in the course of a handful of decades. It is the mechanical conception of the universe, characterized by a convergence of logic, geometry and physics. This breakdown of the scientific model is accompanied by the breakdown of an entire world view, that of "common sense". The intellectual structure of the bourgeois European reality depended confidently and blindly on the power of science and scientific analysis to organize and demythologize the world, liberate it from the unpredictable grasp of religion and the supernatural. The scientific *elan* of the 17th century had already cleared the way for the economic development of the 18th and 19th centuries. On the one hand, the by-product of scientific discovery—technology—proved itself to be the fundamental ally of capitalistic development, opening discoveries of new fields and new techniques. On the other, science as ideology cleared the way for the notions of predictability and stability. Lastly it produced a notion of evolution which was immediately coopted by the doctrines of capitalism in order to found the endless necessity of economic expansion.[12]

Science had rendered nature safe for free enterprise. Common sense and "intuition" were not only the names of a certain relationship to the nature world. They became *values* within a system which surpassed them, they became functions of an ideology that was external to them and which never had seen the light of day in debates or discussions of how or what the world is. The universe was understood as mechanical in accordance with a kind of visual model. The senses were the ultimately dependable measure of the coherence of the external world. Judgment, intuition and reason, while arguably both socially and ideologically determined, were understood as the definitive basis for a grasp of human reality, the foundation of the naturality of nature.

The crisis of the natural sciences at the turn of the century consists of an uncoupling of science and intuition. The "real" as it is postulated by specialists of the natural sciences was suddenly no longer attached to the real as it is experienced by laymen and civil leaders who sought to construct industrial empires on the footings of empirical

[12] Eric Hobsbawn, *The Age of Empire*, London. Abacus, 1987, p. 244.

predictability.[13] Both physics, chemistry and mathematics were characterized by their pragmatic aspirations and their rigorous appeal to the mechanics of intuition.[14]

The 19th century saw both the institutionalization of mathematics, their widespread teaching and social circulation and its application to standard problems of astronomy and physics. At the same time, pure mathematics began to develop theories and methods for the study of abstract mathematical entities such as imaginary numbers (Gauß), complex functions (Riemann), number theory (Dirichlet), irrational numbers (Weierstrass), synthetic geometry (Steiner, von Staudt), hyperbolic geometry (Lobatschewski/Bolyai), topology (Mobius), chaos (Poincare), divergent series, tensor analysis, differential geometry, group theory and fractals.[15] At the same time, a continuity assumed between the world and the natural sciences, between spirit and matter, was understood as the basis of the unity between philosophy and the natural sciences since the Renaissance. Theoretical mathematics was the foundation. The great philosophers of Renaissance rationalism—Descartes, Leibniz, Spinoza, Pascal, Malebranche, etc.—were also its central mathematicians. The major philosophers of the 19th century had nearly no relationship to the developments in mathematics in the latter half of the 19th century, and no relationship to the fundamental presuppositions of these developments, namely the rise of non-Euclidean geometry .

Parallel fields of the natural sciences saw similar paradigm shifts. In astronomy the consequences of the research of Kepler and Laplace had long been investigated and the movement and characteristics of our solar system thoroughly explored. (Neptune was discovered in 1846, though Pluto only in 1930). The new horizon, however, sprung out of the consequences of the new theories of spectroscopy, the measurement of movement and position based on the measurement in the characteristics of light emitted by objects.[16] This understanding of the nature of light spectrums offered the ultimate preparation for the theory of general relativity, which was to completely shake all previous conceptions of space and time. In chemistry, the revolution in conceptions of the nature of matter, of atoms and molecules, the organization of elements in the periodic system, and the beginnings of organic chemistry all prepared the terrain for the immanent breakdown of the "materiality" of matter, and thus of the common sense conception of the "reality" of matter. The definitive shattering

[13] Hobsbawn, p. 245.
[14] Jean Rosmorduc. *Une histoire de la physique et de la chemie. De Thalès à Einstein*. Paris. Editions du Seuil, 1985, pp. 235-7
[15] Hans Joachim Störig. *Weltgeschichte der Wissenschaft. Natur- und Geisteswissenschaften des 19. und 20. Jahrhunderts*. Augsburg. Weltbild Verlag, 1992, pp. 60-7
[16] Störig, p. 78.

of intuition as foundation for the understandable world, however, comes in the field of physics. Indeed the force of the Newtonian paradigm and the mechanical model of understanding only made the revolution more dramatic. An entire series of discoveries around the turn of the century served to turn the Newtonian system upside down. In 1895 Röntgen discovered the yet unheard of properties of certain kinds of elements to penetrate matter itself. This lead to a more general understanding of radioactivity and of the mutability of matter. In the late 1860's and 70's the notion of the electron was first developed. It was understood as both matter and non-matter, weightless, yet showing signs of inertia, electrically charged, yet changing. Max Planck's quantum theory, which in 1918 earns him the Nobel Prize in physics, inaugurates a new understanding of the relationship between matter and energy, claiming that they are both transformable and transmissible only in discrete packets or quanta. And finally, the nail in the coffin of Newton mechanics is Einstein's Theory of Special Relativity, demonstrating that space and time are a function of movement, not the inverse, that movement is somehow absolutely measurable with respect to an absolute reference in space and time. Further technological advances permit repeated testing and confirmation of the theory.

1.3. The Origin of the Human Sciences.

The movement, in all the natural sciences, toward a disconnection of scientific thought from its material foundations and from its concern with the practical suppositions and consequences of physical reality, has profound implications for the notion of Truth. This is the case, on the one hand, for Truth understood as metaphysical insight into the reality of universe, and, on the other, the establishment of simple criteria for the verification of any statement about the world at all. Indeed, it might be said that the crisis of philosophy at the turn of the century begins with a general collapsing of the distinction between reality and *statements* about it. With the rise of focusing on abstraction, on thought-models and constructions, on natural science as a *metaphysical* discipline, the foundations for understanding the concrete world as a simple set of facts become far more distant. "Common sense", as it were, takes it on the chin. Claims about the factual condition of the world ("Rain is falling on Birmingham") fall into disrepute beside claims about the abstract condition of reality ("4th dimensional space is asymmetrically curved").

The concept of positivism apparently originates from St. Simon (1760-1825) and is developed by the founder of modern sociology, August Comte (1798-1857). Both can be

traced to the British empiricist tradition of the 18th century. Positivism is reborn in the 20th century in the form of Logical Positivism, through the research of a small group associated with a certain variety of analytic and linguistic philosophy, and marked by a deep respect for the natural sciences and a disdain for metaphysics. More formally it originated in a group of German and Austrian philosophers in what came to be known as the Vienna Circle. The group emerged out of a seminar held at the University of Vienna by Moritz Schlick (1882-1936). In 1929 the group produce a program paper entitled "Scientific Worldview" in which it laid out its common principles and took the name "Vienna Circle". In 1930 the group begin regular publication of the journal *Erkenntnis* which appeared until the Annexation of Austria in 1938, which made further collaboration impossible. The main members, such as Otto Neurath, Hans Hahn, Karl Menger, Kurt Gödel, Philipp Frank, Hans Reichenbach, and Rudolf Carnap, an earlier student of Husserl. The Vienna Circle was deeply influenced by Ludwig Wittgenstein who developed a general theory of language and of the relationship between language and the world. Wittgenstein claimed that all linguistic formulations were logical "pictures" of *possible* facts.[17] A statement is meaningful, he claimed, only when it determines the range of conditions in which it is true, in other words, only when it provides the necessary conditions for the world in which it would be true. Except from this definition are (1) tautologies ("The car is blue or the car is not blue") and (2) contradictions. ("The car is blue and the car is not blue"). The former are true in all possible worlds; the latter are true in no possible worlds. Logical Positivism used this theory of meaningful statements in order to develop a doctrine denouncing metaphysical statements as meaningless, defining them as neither tautological nor contradictory.

Logical Positivism is thus a fundamental attitude that attempts to develop a map of reality in terms of tightly defined "meaningful" statements. The result is that Logic Positivism argues that the most appropriate and dependable strategy for reflection is to concern oneself exclusively with that which is "positively" given, in other words, with what is immediately, clearly, unambiguously available to any individual through sensory experience. Only rigorous "positive" descriptions are admissible. In short, what is true is what may be observed. The polemical point is that there is nothing hidden behind the facts, no essence, no higher reality, no eternal wisdom. There are just facts. Thus positivism rejects all forms of metaphysics, all differentiation between what is available to us here and now and what may or

[17] Ludwig Wittgenstein. *Tractus Logico-Philosophicus*. Frankfurt am Main. Suhrkamp Verlag, 1978 (1921).

may not lie beyond or behind what is available here and now. However with the bathwater of metaphysics Logical Positivism throws out not only the baby of moral or aesthetic judgments, statements of religious or spiritual belief, but also any and all expression of emotion or human subjectivity.

Thus at the turn of the 20th century, the natural sciences and philosophy find themselves at each other's mutual disservice. It is not enough that the millennia-long struggle for the acquisition of knowledge and the extension of the limits of the human world has been arduous, it has constantly been plagued by another problem. The long history of the natural sciences has always been tormented by the *question* of what the natural sciences actually are, what their conditions and limits, functions, tasks and obligations are to be. Until deep into the 19th century the particularity of human beings as objects of scientific research was never in question. A sort of no-holds-barred historical positivism was practiced in all branches of what today is called human sciences. Historiography was indeed a science, that is, a systematic and methodological mapping-out of the *facts*, which in all self-evidence are supposed as the most basic expression of what has been. The oft-cited call to order of Leopold Ranke for the historian to reproduce the past as it "actually was" is only the tip of a enormous historiographical iceberg.

Thus to the list of the other foundering institutions of fin-de-siècle mentality must also be added historiography, known, until the 1880's as the grandfather of the human sciences. What today is an obvious methodological question was posed one hundred years ago as a methodological wrench in the works: what is the difference between human and non-human objects? What are the scientific implications of the difference between a tiger-lilly and an expressionist painting? This very same question was posed by neo-kantian philosophy at the turn of the 20th century. The failure of the natural sciences, was always understood as the failure of theoretical formulations to construct a viable representation of the empirical world. The crisis that leads to foundation of the human sciences as such is, however, a critic of the capacity for science to reach an understanding of the human sciences at all.

During the first half of the 18th century European historiography was under the domination of German Romantic philosophy. This tradition, which displaces the pre-Renaissance cyclical theories of history, the heritage of Antiquity reaches back to Herder's *Reflections on the Philosophy of the History of Mankind* (1784-9) and its double logic of historical teleology and subjective rationality, and is arguably completed in Hegel's *Lectures on the Philosophy of History* (1822). For historiography of this period the question of the

relation between and nature is fundamental. History and Reason are inextricably associated through a discourse of origin, development, and goal. The *factual* course of history, the set of empirical events which we take to be the history of the world are understood as the outer surface of some inner function of universal truth. Events are manifestations of truth, in development, truth in denaturalized form, seeking to rediscover its nature. To seize the meaning of the world in general and the past in particular it is not enough to merely assemble the events as such, it is necessary to seek the implicit rationality in events. Historical "objectivity" will not suffice because human beings are deeply entwined in the movement of history. The implicit rationality of historical processes cannot be clearly differentiated from the historical processes of our understanding of ourselves. History is to varying degrees also a subjective operation. Historical research is *human* research, subjectivity and objectivity are inseparable. In this way the Romantic fascination with nature can be understood less as a privileging of the wild and irrational forces of nature, as the insistence on the continuity of the universe, on the naturality of human beings. To seek nature is to seek oneself. The individual is "natural" and the experience of nature is an experience of one's own naturality. The individual profitably seeks insight into its own historical reality by seeking out its position in the harmonious totality of the universe. The *importance* of historical events varies according to time.

At least three variations of the idealist-romantic paradigm can be identified, a theory of progress, a theory of salvation, and a theory of decline. According to the idealist-romantic theory of progress, time itself is meaningful, time is the measure of the varying rationality of events. In conformity with the principles of teleology, the future promises deeper, more meaningful insight into the rationality of the world. From the point of view of the individual historian, the present is inferior to the future. The theory of salvation supplements the theory of progress with the promise of particular historical phases, and with the insistence on a concrete goal at which the meaning of the world corresponds with a redemption of the difficulty of the journey there. The most remarkable modern examples of this model are Hegel, and Marx. The theory of decline is based on the same structure and historical rationality but, obviously, with the opposite consequences. Here the Golden Age is endless lost in the past, and historical time is merely the purveyor of loss. Schopenhauer offers the most pregnant illustration of this point of view.

The middle of the 19th century sees an exhaustion of the idealist-romantic paradigm and its progressive replacement by theories of historicism. Historicism rejects the

gradation of meaningfulness so prominent in idealist-romantic conceptions of time and history. The fundamental principle of historicist method is that otherwise differing historical objects have nonetheless equal value, the object in itself is interesting as object. This implies that not only different periods, but also different economic, geographical, ethnic, religious, social levels and categories cannot be *judged* by the historian, since they are assumed to have the same value in the eyes of the historian, or, in the words of Leopold Ranke, "all periods are equally close to God".

Thus a clear displacement in the notion of *scientific objectivity* can be seen. Henceforth the *values* of historical-temporal evolution are replaced by the those of equality, tolerance, liberalism, humanism, etc. Scientific objectivity, in other words is henceforth understood as the basis for historical understanding. Accordingly methodological developments build upon the notion of critique of sources, systematic methods, and the factuality of the questions. The notion of historical meaning is set aside in favor of analyses of factual situations. *Interpretation* of the facts is an operation foreign to historical analysis.

Consequently, historicism introduces a powerful delimitation of the field of scientific research. Not only is the notion of historical meaning significantly impoverished, but the question of human subjectivity so central to the idealist-romantic model becomes largely marginalized. According to historicism human beings can only be understood as objects for historical research, as a set of data expressing the empirical reality of humans. A symphony of Beethoven is understood as the time interval of notes and the wavelength of audio signals. Historicism is not preoccupied with problems of interpretation of facts, it is a methodology based on the assumption that there is nothing more interesting than facts.[18] In its meeting with hermeneutics at the turn of the 20th century, however, the science of history will meet the human sciences in a test of the humanity of historiography.

Hermeneutics is the doctrine of understanding or interpretation. It thus develops theoretical principles for the generation of meaning, and how meaning in turn leads to the further creation of meaning. One meaningful object—a novel, a painting, a building, etc.—gives rise to others. It is indeed the concept *understanding* which presents the turning point in the battle for science, or rather for the scientificity of science. Modernity was conceptualized by Descartes, Newton, Kepler, and—as well shall see with respect to Husserl—Galileo, as a purification of explanation as the objective, non-interfering relationship to the

[18] Paul Veynes, *Comment on écrit l'histoire. Suivi de Foucault révolutionne l'histoire*. Paris. Editions du Seuil, 1971, pp. 158-60.

object of science. In 1937 Johann Gustav Droysen (1808-89) published *Historik* in which he proposed the use of the notion of explanation understood as the analytical alternative to *understanding*.[19] Scientific research is an activity which necessarily produces meaning. The distinction made by both historicism and the natural sciences in general since the Renaissance is based on the validity of two different types of research objects. Natural sciences pretend to *explain*, while historians pretend to *understand*. Droysen simply asks whether this distinction is appropriately grounded. Droysen's critique of historicism builds upon a critique of this opposition. Any positivistic historiographical strategy relies on a need for absolute differentiation between explanation and understanding, and, moreover, builds its "understanding" of history on a purely "explanatory" method. If historiography wishes to make a claim to scientificity, it must first be able to clarify which historical facts are relevant for any given problematic. Explanatory strategies are defined as those which do not apply discriminating criteria to scientific objects. For such criteria would be, by definition, unscientific. In order to be science, historiography must take cognizance of its own activity, it must be self-reflexive and apply a self-conscience *understanding* to its activity. It short, it must be that which it has always sought to distance itself from. Historiography's self-constituting moment is its own identity crisis.

Despite reproaches to the contrary, Droysen's intention was nothing less than to legitimate historiography as a science. In attempting to do so he constructed a connection between the historicism of the 19th century and 20th century hermeneutics that was to open the way to the contemporary human sciences. And yet by laying the foundation for the revolution in the natural sciences—in the humanity of the natural sciences and the naturality of the human sciences—he opened the door to the scientific legitimacy of the human sciences. The final brick in the construction of that edifice was provided by the philosophical movement known as Neokantianism, and above all by the Wilhelm Windelband (1848-1915) and Heinrich Rickert (1863-1936) Neokantianism leads a critique this methodology and thereby revises the status of human beings as objects of history. Simplifying we can say that Windelband and Rickert were interested in developing a doctrine describing the conditions of scientific knowledge, a fundamental concern of Kant's *Critique of Pure Reason* (1781). The Kantian revolution held that the conditions of possibility for certain knowledge of nature were proper to humans, not a part of nature itself. We thus meet a slightly more philosophical

[19] "Das Wesen des historischen Menschen ist forschend zu verstehen". Johann Gustav Droysen, *Historik*. München, 1937, p. 328

version of Droysen's own provocative claim that a certain self-reflexivity is necessary for any scientific attitude toward nature. Windelband and Rickert confirm, in good Kantian tradition, that knowledge of nature presupposes knowledge of human beings. The frontier between natural science and human science is thus eroded in the very moment it is formed.[20]

2. The History of Science as the History of Crisis

2.1. Edmund Husserl (1859-1938)

Edmund Husserl was born on April 8, 1859 to German speaking Jewish parents in Prossnitz in Moravia, then a part of the Habsburg Empire, in the territory that is now the Czech Republic.[21] Husserl himself converted to Protestantism at the age of 27. In 1876 he moved to Leipzig, where he studied astronomy, mathematics and physics, and some philosophy. From 1878 he continued his studies in Berlin, then in Vienna. He earned a doctorate in mathematics in 1883 for a dissertation on the theory of variations. From 1884 to 1886 he attended the philosophy lectures of Brentano in Vienna. Following Brentano's advice he moved to Halle in order to study under Carl Strumpf, one of Brentano's students, and to prepare the Habilitation on the concept of number.

In 1887 Husserl was made *Privatdozent* at the University of Halle, working on questions of logic and the foundations of mathematics. He published his first book in 1891, *Philosophy of Arithmetic*. In 1900 he published that Platonic *Prolegomena to Pure Logic*, the introductory first volume to the *Logical Investigations*, whose second volume was published the following year. The book won him an assistant professorship at the University of Göttingen, a well-known center for mathematical research, where Husserl collaborated with David Hilbert. He was appointed to a chair in 1906. In 1916 he accepted a call to the University of Freiburg where he succeeded the Heinrich Rickert, the instrumental philosopher in the rise of neo-kantianism. It was in Freiburg that Husserl began his association with Martin Heidegger. By the early 1920's Husserl was the leading philosopher in Germany. In 1929 he retired from his chair and was succeeded by Heidegger. Thereafter he published

[20] Both Rickert, Dilthey and others sought to develop a differentiation between the human sciences ("cultural sciences") and the natural sciences. Rickert proposes focusing on methodological differences, instead of epistemological. Heinrich Rickert, *Kulturwissenschaft und Naturwissenschaft*. Töbingen 1921.

Formal and Transcendental Logic and, in 1931, *Cartesian Mediations*. From around 1933 Husserl began to experience problems associated with the rise of the NSDAP. Because of his Jewish background he was deprived of his library privileges at the University of Freiburg by his former student and colleague Heidegger, who became rector of the University in the same year. By 1935, feeling acutely the political situation in Germany, Husserl begin seeking ways to have his work removed to safety abroad. He died in April, 1938.

Husserl's career is typically divided into three periods. The first encompasses his confrontation with the psychologistic position in the foundations of arithmetic in an effort to establish an objective foundation for logic and mathematics within human psychology. The second period corresponds to the development of the terms of his own system of phenomenology understood as transcendental idealism. The third period encompasses his work toward embedding the very individual terms of phenomenology in a system of intersubjectivity, culture and history. It is this final period, leading ultimately to the posthumous *Crisis in the European Sciences*, published in 1935, which will be of primary interest for us.[22]

2.2. The transformation of mathematics in the Renaissance and the return to Euclid.

In his *Prolegomena to Pure Logic*, published in 1900, the same year as Max Planck's *Quantum Theory*, and Freud's *The Interpretation of Dreams*, Husserl makes a direct contribution to the positivism debate mentioned above. The work simultaneously supports the premises of positivism—that the only reliable foundation for knowledge is that which is immediately given—and radically modifies it procedures. The originality of the work is its distinction between the *process* of thinking, the "thought act", as he formulates it, and the *content* of thinking. The former, claims Husserl, is in indeed a fact, in line with the criteria and aspirations of logical positivism. In other words, it can be studied and analyzed as a factual thing without entering in any dialogue with the *meaningfulness* of the content of

[21] In the following three paragraphs draws on biographical information found in Barry Smith and David Woodruff Smith. "Introduction" to *The Cambridge Companion to Husserl*. Barry Smith and David Woodruff Smith (eds.). Cambridge. Cambridge University Press 1995, pp. 1-8.

[22] The first half of the what is today the standard edition first appeared in *Philosophia* I (1936), pp. 77-176. The longer version of the work was first published posthumously in the *Husserliana* Edition by Nijhoff (The Hague) and since 1989 by Kluwer Academic Publishers (Dordrecht/Boston/London) as *Die Krisis der europäischen Wissenschaften und die transzendentale Phänomenologie. Eine Einleitung in die phänomenologische Philosophie*, edited by Walter Biemel, 1959. In English translation, *The Crisis of the*

thought. The intention of thought—what thought aims at or "wishes" to think—is completely independent of the structure of thinking. Philosophy, he claims, has neglected to explore this structural aspect of thinking. Psychology in particular is guilty of blurring what is thought with the way it is thought. Husserl sees his mission as the liberation of logic and the structure of thought from its unclear status in psychology. Through the distinction made in his early works, Husserl thereby founds a new "positive" science which in principle will significantly advance the frontier of what is concretely knowable.

In the Platonic scientific tradition the notion of "ideal" space poses no problems. It is in fact the presupposition of the "idealism" of the entire system. According to Plato, reality is graduated. Reality is not entirely associated with the existence of non-existence of any given object. Some objects are indeed "more" real than others. The reality of a given object is a reflection of its proximity to ideal being. Some "things" exist on higher planes of being than others.

The notion that the universe is somehow homogeneously rational is thus an essential mark of the modern. It is the basis for a conception of the natural sciences which envisages a systematic rational enterprise destined to take hold of and dominate a systematic, rational world. The reasoning behind the *raison d'être* of modern science then quickly accelerates into the modern notion of progress: infinity of objects, infinity of means, infinity of tasks, infinity of progress. In other words, just as reality is an endless set of ideal forms in good platonic tradition, the natural sciences face an endless set of scientific tasks which will nonetheless never be capable of exhausting the endlessness of its material capabilities.

Three key elements hold this new world-view together. All three will be essential for the notion of crisis with which Husserl operates. First, that the universe is a rational *totality*; second, that the natural sciences, invention of the new humanity, are a rational *instrument*; third that there is a general *applicability* of the (rational) natural sciences on the (rational) totality of existing things. As Husserl himself notes, the relationship between the ontological claim about the rationality of the universe and the epistemological claim about the rationality of the new scientific methods are mutually determinate: the one provides support for the other.

(1) As we have already suggested, the new age of science that begins in the Renaissance is concomitantly a new age of ontology. In other words, the conception of what

European Sciences and Transcendenal Philosophy. Introduction to Phenomenological Philosopy. Translated by David Car. Evanston, Il. Northwestern University Press, 1970. Citations refer to the German text.

exists is linked to the conception of what knowing it presupposes and what knowing it implies.

(2) Thus in his *Discourse on Method* (1637), Descartes seeks to construct a science worthy of the rational world of which it is supposed to be the mirror. Yet despite the fact that a new understanding of the world as rationality dominates both philosophy and the natural sciences, the structure of the scientific method developed to handle it is well over a millennium old. Like many in his philosophical generation, Descartes takes Euclidean geometry to be the model of all theoretical science. A science such as physics should be based on first principles comparable with the axioms of geometry, which were discovered and validated through the systematic analysis of intuitive ideas. Descartes thought, for example, that the law of inertia could be seen to be true through the use of reason alone. This view, that science can be based on principles that are revealed through introspection, is characteristic of Descartes' rationalism.

(3) What then remains from this conceptual-ontological overhauling of science is two forms of rationality, a methodological one and one focused on the nature of reality. Yet the conceptual tools used to form theories about the nature of reality are already rationalistic in their very nature. Through the glass of rationalism we see only a rational universe which then requires a rational methodology in order to be understood. In other words, the frontier between the rational and the non-rational is not just one frontier among others. It is the frontier of all frontiers, the one which enables us to draw conclusions about objects, their properties, and their limits. The operation by which the rationality of natural science is applied to the rationality of nature is the great development of Renaissance philosophy, and the modern individual is henceforth defined as one who exercises the power of assembly of the threefold elements of existence: rationality, science, and reality.

According to Husserl, the history of science since Antiquity corresponds to the development and idealization of this structure. The meaning of science, he suggests, has always already been loaded with the need to realize or concretize a kind of ideal form (*Konstitutionsgebilde*) of what human subjectivity—the human relationship to the concrete world—actually is, provided it develops itself sufficiently. What should stand in the way of that? The difficulty implicit in this ideal of the European sciences is that it requires that an infinite research project be completed through finite means. The ideal of the sciences as universal and ultimately grounded activity supposes that the objective world can in some way be exhausted, that it is thinkable in its totality, and that it is somehow pragmatically possible

to exhaust the complete set of research objects which its premises can generate. This means that all the objects belonging to the concrete world must somehow be torn out of their apparently endless mundaneness and anonymity, and given particular, individual meaning.[23]

Still, despite its Euclidean roots, the discovery of this paradox does not belong to Antiquity. The insight in the endlessness of the scientific task is rather the mark of modernity. It is part of both modern epistemology, the concern with the presuppositions and limits of knowledge, and of modern ontology, a new conception of the relationship between real existing individuals and the world in which they live. Just how commensurable is the conception of the infinity of field of natural sciences and the infinity of mankind? Are humans capable of designing and carrying out a scientific project capable of exhausting the field of all scientific objects? And is that what "universality" really means? Finding the "one" correct question to ask of the entire universe, then dedicating infinite effort to extracting the answer? In other words, the general critique of Enlightenment themes of universality so prevalent in the fields of cultural studies today, has a precursor in the Renaissance "philosophy" of the natural sciences.

In this sense the relationship between the physical world and human understanding of the physical world must be seen from both a subjective and an objective point of view. From the objective point of view, the aspiration, or rather the assumption that the project of objectively knowing the world is realizable has, since the early days of our century, been associated with "physicalism" or "physical objectivism", and with the doctrines of Logical Positivism and Logical Empiricism. We will return to their arguments shortly. For the moment, let us simply note that they see the aim of science, and indeed the aim of the philosophy of science, as a clarification of the world as it is. "Physical reality" is the only valid measure for any claims about the world. The physical world is what it is, and true scientific claims about it can be arrived upon by simply clearing away impediments to contact with it. From the subjective point of view, the conception of the world as an object or a set of objects that is fully understandable supposes a certain notion of human subjectivity. That human beings can somehow rise above the physical world, transcended it, and conceive it as a universal whole, making of it a completely coherent thought or conception is what Husserl and others have called the doctrine of "transcendental subjectivism".

2.3. The Euclidean Enterprise

[23] Werner Marx, *Die Phänomenologie Edmund Husserls*. München. Wilhelm Fink, 1987, p. 112.

Euclidean geometry provided Antiquity with a strictly *formal* conception of the universe. In other words, once we have understood and assimilated the definitions, axioms, and theorems which Euclid claims are universally valid for the universe, we can simply busy ourselves with applying them to any and every *thinkable* object. The *reality* of such objects is unimportant. Or, rather, the reality of the object consists in our capacity to think of it and apply the given rules to it. As far as "reality" is concerned, there is no interesting distinction to be made between a trapezoid which I imagine, a trapezoid drawn on the blackboard, and a trapezoid garage roof. The *reality* of the thing is solely a function of the validity of the definition which is applied. The question of existence becomes abstract, subjective, and transcendental. At the same time, human beings in Antiquity related far more immediately to the world than one could say we experience today. The reality of the world is dependent upon its immediate or relative presence to our perception. The environment is understood as the set of things that are visible or perceivable. Husserl claims that human beings in Antiquity were incapable of understanding this distinction between a scientific intellectual construction and their experience of the world. The difference between the physical world and the subjective world, or to use Husserl's terms, the difference between "physical objectivism" and "transcendental subjectivism" is a novelty proper to modernity.

Euclid's fundamental contribution to the mathematics of his period did not consist in new discoveries, but rather in a reorganization and systematization of the existing mathematical knowledge. Euclid's *Elements* is built like the framework of an enormous building. It consists of three types of geometrical statements, definitions, postulates and axioms, proofs and theorems. It is assumed that the axioms are true, and that they may be used as presuppositions for logically valid reasoning which produces necessarily true conclusions. Euclid's thought system is thus *deductive*, it provides the structure by which a certain number of true postulates may be used to deduce true statements about any number of objects.

As far as the philosophy of science is concerned, the greatest implication of this theory is its capacity to produce "true" conclusions about objects which as yet have not been observed. If we accept Euclid's *definitions* of the point, the line, the angle, and the triangle, we must necessarily conclude with Euclid, for example, that the sum of the angles of any triangle is equivalent to a straight line (180 degrees). The important consequence is however that this theorem is now valid not only for those triangles which we can actually observe and investigate. It is also true for those triangles which we have not yet seen or experienced.

Consequently we suddenly find ourselves making claims about objects we have never seen, and which very well may not exist at all. Space and time in which these objects are thus supposed to exist no longer requires a verifiable set of objects in order to be meaningful. Space and time become henceforth the imaginary framework, or the imaginary *horizon* for our conception of ourselves in a world of triangles and other objects.

2.4. Galileo and the Birth of Modern Science

The discovery of the celestial movements had already been ascertained by the astronomers of Antiquity. With technical instruments, which paled compared to the advanced telescope and measuring devices used by Galileo, calculations, and observations were carried out which established the notion of natural law. Yet this conception of natural law is a far cry from the modern association of the "outer world" with the "inner world". Modern science begins as the science of the *unobservable*. Instead of comparing theoretical suppositions with "real" observable, and thus measurable, data, modern science seeks to associate theories of reality with the unobserved, and in the end with the principally unobservable.

Galileo's conflict with the Catholic Church is well known. By the end of 1609 he had successfully constructed a 20-power telescope that enabled him to detect previously unseen "planets" revolving around Jupiter, observe the phases of the planet Venus, and confirm, to his satisfaction, the Copernican theory of the heliocentric world system. The Church, which held the view that the earth was God's central and primary creation, found the notion that the center of the universe should be elsewhere completely unacceptable. Despite Galileo's appeal to the Grand Duchess Christina, the Holy Office at Rome issued an edict against Copernicanism in 1616. In 1623 Maffeo Barberini, who was more favorable to Galileo's theories, became Pope Urban VIII, and Galileo received permission to write his *Dialogue Concerning the Two Chief World Systems* in 1632, for which he was called to Rome and tried and condemned to life imprisonment for suspicion of heresy. The sentence was later commuted to house arrest.

The prosecution and the defense were largely incommensurate, the Church arguing on the basis of a principled world-view, while Galileo insisted to a large degree on the empirical material supporting his claims. Indeed Galileo defended himself before the Holy Office by making the particularly positivist claim that empirical evidence and mathematical

proofs should not be subject to the scriptural interpretations.[24] But Galileo was not condemned on the basis of empirical data. The foundation of prosecution of the Holy Office was a certain vision of the *invisible*. Of course Galileo had gone quite far to push back the threshold of the invisible. By perfecting and systematically applying the telescope he was able to observe and document more of the universe than ever had been done before. The spiritual-ideological battle field was, however, beyond, as the metaphysical framework of human self-understanding. Indeed it is *defined* as beyond. Notwithstanding, the important critique of methods and presuppositions of data collection, empirical material in itself is uninteresting for the for the construction of reality. The conflict surrounding Galileo was a *metaphysical* one. It was concerned not with the empirical constitution of the world, but rather with the projection of the presuppositions, based on empirical facts, into the unknown and the invisible. It is thus a question of the function and limits of religion, which causes the scandal at the dawn of the modern. Galileo's opening of modern science is not what he saw, but what he felt entitled to claim about what he *didn't* see. Modern science is born of the formalization of modern science, of the understanding of the possibility and legitimacy of the projection of a formal or structural understanding of the universe on a universe of such enormous dimensions that it is radically unknowable in its entirety.

Oddly enough, Galileo is typically announced as the first modern scientist namely because he leaves theological models of understanding far behind.[25] Galileo is praised more as mathematician than physicist. A researcher who focus on how phenomena take place, instead of what kind of essence lies behind them. His fusion of mathematics and philosophy of nature, which leads to the mathematization of nature which occupies Husserl, is understood as the purification of the natural sciences of their superstitious underpinnings. Still we must look again at the nature of modern science's extrapolations, and ask what metaphysical presuppositions lie behind the infinitization of the here and now.[26] Modern science is in a sense a new metaphysics, a new religion, a new superstition. It does not demand that we reject obsolete empirical evidence in place of new, but rather it demands that we reject the dominant doctrines of Christianity in favor of a new religion of the unknown and the unseen.

The key to the catastrophic reopening of the Greek mathematical and physical ideals, is not a theoretical but a pragmatic one. For it is a question of which tasks may be

[24] Karl Von Gebler, *Galileo Galilei und Die Römische Kurie*. Essen. Phaidon Verlag, pp. 343-47.

[25] Cf., for example, Max Jammer, "Gesetz", *Handlexikon zur Wissenschaftstheorie*, Helmut Seiffert & Gerard Radntzky (Hsgbrs.). München. Deutscher Taschenbuchverlag, p. 114.

[26] Paul Feyerabend, *Wider den Methodenzwang*. Frankfurt am Main. Suhrkamp Verlag, 1986, pp. 91-2

asked of mathematics and physics in particular, and the natural sciences in general. In Husserl's view, modern science, beginning with Galileo's improvements on Euclidean geometry has done an enormous service to the project of a construction of a comprehensive understanding of the world. That radically new and virtually unthinkable aspect which inaugurates modernity is therefore neither a revolutionary theory, nor newly discovered empirical material. It is a mutation in the field of application of the dominating scientific model.

The key to the continuity of this analysis of inflation of the natural sciences is a particular understanding of the evolution of mathematics. The extension of a conception of the infinitely rational nature to that of the infinitely rational sciences requires a communication or a conduit uniting nature and science. It is the modern development of mathematics which , according to Husserl, guarantees this unity. And it is only in the post-Renaissance period that the mathematical instruments available to scientific thinkers begin to "conquer and discover" (19) the infinite mathematical horizon, through the development of algebra, continuum mathematics and analytical geometry.

2.5. Galileo and the Mathematization of Nature

The passage from Antiquity to the Renaissance is thus one of recapitulation and modification. The central element retained by Renaissance thinkers is the notion of an idealized understanding of reality. Everything which exists does so in relation to an ideal form of existence. This ideal is then the measuring stick of the reality of the object in question. The geometry of Antiquity—primarily Euclidean geometry—is based on a methodology of application of the presupposed ideal on any given real existing object. In this sense the ideal precedes any experience of the world we might have. Moreover, the ideal is the *precondition* of our experience of the world.

In the Renaissance this ideal-as-precondition is conserved, but the nature of that ideal is transformed. One of the central figures of this renewal-with-a-difference, this *Instauratio magna,* was Francis Bacon who saw virtue in Ancient scientific models, but who sought a "rationalization" and systematization of their foundational principles. According to Bacon, scientific modernity shares the imperatives of research laid out Antiquity to seek truth and wisdom understood as universal values. But he saw a transformation in the universality of such universal values in the discovery of vast variation of empirical reality through gradual

development of methods of data collection.[27] The natural sciences have, according to Bacon, developed discontinuously through three periods, the Ancients, the Romans and the "Moderns", interrupted significantly by the Scholasticism of the Middle Ages. The cause of this uneven development is the misunderstanding of the proper goal of the natural sciences, namely the "enrichment of human life through new inventions and means." At the same time Bacon was an empiricist in the sense that the basis for "new inventions and means" had to spring out of our experience of the world. The rationality of the sciences arises from the rationality of the factual world. It is precisely this synthesis of platonic idealism—the assured ideality, or in modern terminology, rationality—assures the validity of empirical investigation. There is a necessary correspondance between our observations and the rationality of the universe.

In this sense we can say that Galileo was the first to operate with a distinctively modern conception of both nature and of the knowledge he sought to discover about nature. Both were understood as "rational", but "rational" in a particularly innovative sense. Since Cicero the Latin *ratio* has been used to translate the Greek *noûs*. But *noûs* is understood in early Greek thought as far more theological, far more based on a comprehensive understanding of the role of given object in a larger cosmos or context. The modern sense of the word *ratio* has, in the spirit of the new empirical sciences, taken on the meaning of discrete unity. "Rational" is that which may be divided up into discrete unities, observed as singularity, and assimilated to a general categories that assembles that singularity into an understandable whole. Whereas the classical conception of rationality is based on the inscription of an observation in a global understanding of the universe, the Renaissance (and "modern") notion of rationality corresponds to the inscription of an observation into a self-referential, closed dialectic of theory and observation. For Galileo this "mathematical" understanding of rationality is the decisive precondition for the understanding of reality. It is what Husserl calls the "self-evidence that motivates Galilean thought", that is, "everything, which, in the evidence of absolute universal validity, geometry and above all the mathematics of pure spatio-temporal forms teaches us with respect to the pure forms which may ideally be constructed" (21).

2.6. Husserl and the Crisis in the History of Modern Science

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[27]Matei Calinescu. *Five Faces of Modernity*. Durham. Duke University Press, 1987, pp. 23-26. Störig, pp. 241-46.

We have described Husserl's historical conception of the modern as a situation of homogeneous unity. The unity and continuity of reality and rationality—of the ubiquitous nature of rationality, and of the universal applicability of one and the same reason—form what he sees as the background to Galileo's understanding of the world. The problem of the contradiction between the infinity of the universe and the finite numbers of humans, the endless number of tasks necessary to comprehend the world scientifically, and the limited resources of the human scientist, is solved in Galileo's time by the principle of extrapolation and universal applicability.

It is precisely this doctrine of applicability that has today fallen in disrepute. For the ideality of mathematics has a Janus face. While it normalizes all domains of reality, brings them under one and that same transcendental rubric of rationality, it does so through a "mathematization" of the world that is at odds with the cultural dimension of reality. If nature and reality in general can be exhausted by mathematical means, there is no room for humanity, for culture, social and historical meaning. Moreover, the process is self-reproducing. Mathematical rationality being the only measure of reality, it is mathematical rationality that is applied as a means to self-understanding of the natural sciences, mathematics is "pure regard", "application on itself" (46). It becomes a mere technique, art, in the purely technical sense. If it manages to create meaning, it is only in the self-regulation of its own rules and parameters. The rules and parameters require analytic (mathematized) technique which in turn can only be understood in turns of the mathematical relations which they manufacture. The "mathesis universalis", coined by Leibniz is self reproducing: The farther physics penetrates the natural world through its logic of mathematization, and the more mathematic-scientific formulations about that world it has available to it, the larger becomes the field of possible conclusions which can be drawn from those formulations. (47). All notions of content, of reference to those humans who are objects of or deploy the natural sciences are completely excluded. Human beings can be understood only to the extent that they are quantifiable.

In Antiquity, at the moment of the formation of the first scientific principles, rationality was understood as *episteme*, as a comprehensive form of understanding. Mathematics was for the Greeks a *meaningful* science, an activity which gathered both what we understand to be the numeric function of mathematics, and the "natural" and "cultural" elements of the same. Mathematical understanding of nature was inseparable from a cultural understanding of reality, with references to artisanal crafts, social unities, family, home, etc.

These provided the foundation for the production of meaning with respect to the sciences. Indeed the culture of the pre-scientific human provides the basis for the scientific method which follows it. The natural sciences function like machines that simplify and reduce objects to numeric facts, tear any possible meaning or content away from the idealized form, and discard it as immeasurable. They fail to understand "facticity": the human or hermeneutic dimension in the relation to any given fact.

What originally was a unified reality in the philosophy of Antiquity is thus now split, the scientific and humanistic sides are irreducibly parted. The modern age is marked by what Husserl calls the opposition between "physical objectivism" and "transcendental subjectivism".

In a paragraph entitle "The Life-world as Forgotten Foundation of Meaning in the Natural Sciences" Husserl describes the process by which the European sciences have ended in today's situation of crisis. Already Galileo, claims Husserl, was responsible for the suppression of the cultural, societal dimension of science—the life-world—a suppression that became the heritage of the physical sciences, then later, as the physical sciences became the dominant form of inquiry, it became dominant for other branches of natural science as well. According to Husserl, Galileo marks his own modernity by wrongly attributing to the "mathematically substrated world of idealities" what actually belongs to our "everyday life-world" (48-9). This false attribution has immediate consequences for the physicists of the following centuries. At the same time, and to Galileo's credit, Galileo himself had inherited the privileging of *techne*. According to Husserl, even Greek geometry was developed on the theoretical level before it became a tool for making field measurements. Its own "ideality", not a more proper relationship to everyday life, is its foundation of meaning. This foundation is then the model for the great inventions of "idealization" which have been so dominant in the history of physics, mathematics, and the natural sciences in general, and which have so distended the relationship between the sciences and the world of culture, society, and history. Husserl is unusually critical of Galileo and the "fateful omission", which made him and generations of geometers blind to the complicated sources of meaning which the homogenizing and simplifying function of mathematization is incapable of taking account of (50).[28]

[28] A useful contrast to Husserl's extremely critical attitude toward Galileo may be found in José Ortega y Gasset's "En torno a Galileo" from roughly the same period (1933). *Obras completas*. Madrid. Revista de Occidente, 1950.

In other words, those who invest in the systematic methodology of idealities meet themselves in the doorway, as it were. Those who ground their investigations of reality on idealizations of reality, can never go beyond such idealizations in their own self-understanding. They are structurally incapable of seeing that science is also an object of scientific thought, that the purpose of life also belongs to life. Regardless of religious predisposition, the foundation of the meaning of life is living, not some abstraction of life. Likewise, the meaning of science cannot be an abstraction of science. Through the process of geometrical and scientific mathematization we end up measuring our life-world according to criteria which are not concomitant with it. We measure the life-world in the "ideational clothing" of the "so-called objective sciences"(51). The result of this clothing is that we confuse the method itself for "true being", and thus the true meaning of the method, its formulas and theories remain unintelligible to us (52).

The natural sciences, from Galileo to our times, have been a theoretical failure because they have failed to take the radical consequences of their own historical foundations. The natural sciences have indeed failed to penetrate the meaning of their own method, have not been able to arrive at self-evaluation and self-critique because they have "forgotten" that the foundation of quantifiable method is itself unquantifiable.[29] The natural sciences have fallen into a hermetic trap, they have forgotten their extra-scientific origins. The natural sciences are structurally incapable of asking themselves, what is natural science? The true meaning of scientific processes in general and the natural sciences in particular is to found in the *origin* of the natural sciences, which itself is beyond science. The ultimate foundation of the natural sciences, as of any experience of reality is what Husserl calls the life-world. The life-world is the horizon of possible experience, the background that universally makes all experiences in particular understandable as experiences. The world is thus not at all the "world" as understood by the natural sciences, that is, a certain number of exhaustible objects of research. It is far more the ensemble of all things of which we are or can be conscious of.

What is the difference between the world of the sciences and the world of the life-world? We could begin by comparing the notions of "Truth". "Truth" for natural sciences is a perfect correspondence or adequation between a given thought or criteria and the data that is available.[30] It is thus a one-to-one relationship, and in that sense the essence of quantification. Both the question or criteria and the object are supposedly exhausted, fully understood by

[29] Nick Herbert, *Quantum Reality. Beyond the New Physics*. New York. Doubleday. 1985.
[30] Jean-François Lyotard, *La phénoménologie*. Paris. Que sais-je, 1950. p. 37

virtue of merely being placed into a relation with each other. Thus, for example, "Is Venus a planet which rotates in a clockwise direction?" is a question which can in principle be exhausted by bringing to bear the right empirical data. The problem for Husserl and his conception of history, society and culture is that this "Truth" implies no "lived experience". It is fundamentally a-human, even though it is supposedly deployed by a human scientist. It is not embedded in any form of social or cultural horizon. Moreover, if such an adequation were possible, it would be outside of our thinking it. Self-sufficient, it would not be thinkable from the outside because philosophy, or whatever instrument that defined the adequation couldn't have any part in it. The perfect experience, one which would be spontaneously and completely meaningful, is not possible."[31]

On the other hand, the scientific experience *is* real, it is not just a set of principles or theories which deploy themselves as pure knowledge. There is a necessary rapport with the actual things of the world. In other words, the truth about the world is *lived* truth, the result of the application on the world of our awareness or consciousness. From this point of view, in order to answer the question, "Is Venus a planet which rotates in a clockwise direction?" we are required to actually observe Venus as real individuals, with different presuppositions and backgrounds. Clearly the only meaningful arrangement is some synthesis of the two, some common ground between the empirical reality and the subjective experience of it, or to use Husserl's expressions, between physical objectivism and transcendental subjectivism. Husserl faults the European sciences for neglecting this unity, for overseeing the unity of the life-world as the basis of the European self-understanding.[32]

Conclusion: Culture as Crisis

The period between the last decades of the 19th century and the death of Edmund Husserl in 1936 consists not only of a remarkable concentration of cultural and scientific creation, but also of an uncanny instability in the space between culture and science. The advent of quantum theory in the last years of the century brings with it a radical change in the self-understanding of humanity. At the same time, the crisis at the origin of the modern human sciences puts into question the entire enterprise of the natural sciences. Husserl's *Crisis* book rigorously exemplifies this paradox by making an impassioned plea for the re-foundation of

[31] As Habermas has expressed it, "The meaning of knowledge itself becomes irrational in the name of knowledge". *Erkenntnis und Interesse*. Frankfurt am Main. Suhrkamp Verlag, 1988, p. 90.
[32] Cf. Paul Ricoeur, "Objectivité et Subjectivité en Histoire" in *Histoire et vérité*. Editions du Seuil, 1955, p. 34.

the natural sciences through their *re-humanization*. The unacceptable delinquency of the modern sciences lies in their neglect of the true nature of scientific objectivity. They have namely "forgotten" that the originary foundation of objective science lies in the life-world, understood as the synthesis of both the objective-physicalistic and the subjective-transcendental.

Thomas Mann's own self-revision is in this light particularly revealing. As mentioned earlier, a family squabble between Mann and his brother Heinrich was played out in the public sphere as a debate between Enlightenment democratic ideals, on the one hand, and traditionally based systems of value and authority, on the other, between the French 19th century novel and theater and German late Romanticism. Throughout his 1915 polemical work, *Observations of an Unpolitical Man,* Mann berates his unnamed brother as a *Zivilizationsliterat*, a double insult evoking both the mechanical pretense to civilization through the mere virtues of rationality, overlooking, ignoring, or otherwise disdaining the civilizational presuppositions monopolized by the merits of the spirit, and a slap at the entire 19th century French literary intelligentsia and what he saw as the artificial rationality of social realism. And yet beginning in 1920, Mann spends a significant amount of effort publicizing his "democratic confession"", his greatest embarrassment thereafter being the ungainly 1915 polemical piece.

In vicinity of Husserl's *Crisis* book, the arguments of *the Observations of an Unpolitical Man*, like those of the Weimar anti-Republican intelligentsia in general, are strangely near. For the technologizing and mathematizing dimensions of modern physics since Galileo are criticized by Husserl in a manner very much parallel to Enlightenment strains of democracy. Thus in the Forward" to the *Observations* Mann attacks the lack of European spirit in the social conceptions of the new democratic movements. "The self and the world are the objects of our thought and poetry, not the roll, which a self sees itself playing in society, and not the mathematical-rationalized social world that forms or formed the object of the French novel and theater".[34] The problem with democracy is that it aspires to a kind of human objectivity which empties human history and human endeavor of its meaningful content. Indeed it evacuates any room for humanity. The democratic insistence on the absolute identity, sovereignty and rationality of the individual, does nothing more than create

[33] Thomas Mann, *Betrachtungen eines Unpolitischen*. Most of the essays and speeches colleceted together in the most recent edition of *Observations* express this sentiment in one form or another. Cf. for example, "Kultur und Politik", pp. 853-861.

[34] Mann, pp. 35-6

an abstraction of that individual, an ideal-type, to express it in phenomenological manner. From a structural point of view, this seems to be the very claim Husserl wishes to make with respect to the disregard of the life-world.

Yet here a troubling parallel presents itself. For, as we have indicated above the cultural arguments of Husserl's anti-republican contemporaries—the early Thomas Mann and Leopold Ranke, among countless others—often made use of such arguments in order to criticize the lack of cultural and historical foundations in the Weimar democracy. In other words, Husserl constructs a line of argumentation *analogous* to that presented by the anti-republicans of the late twenties, the very anti-republicanism that prepared the way for the rise of the NSDAP and its ideologies of anti-democracy and anti-Enlightenment—the very same political ideology by which Husserl was himself victimized in the 1930's.

It would be absurd to claim that Husserlian phenomenology fueled anti-republicanism. And yet the most remarkable and forceful aspect of the long and elegant arch of Husserl's career, is its movement from the extremely tight analyses of the functions of logic in his *Philosophy of Arithmetic*, to the poignant, ethically motivated considerations of history, society, and culture in his later and posthumously published works. Using an extremely technical language and conceptual apparatus, he shows himself capable of delicately drawing out the contours of human experience. As we have seen, the *Crisis* book attacks the evolution of the European sciences for its forgetfulness of the life-world, that is of the cultural, social, human dimensions implicit in the potential intelligibility of the world. Instead, the sciences have proceeded with a mathematization, an instrumentalization of reality, which unavoidably disregards the foundations of human experience. The often intense critique directed against the Weimar Republic, in particular from 1926 until the formation of the Brüning government in 1930 by the anti-republican intelligentsia was often explicitly based on a concern similar to that of Husserl, a preoccupation with the dehumanization of society through the quantification of individuals and the institutionalization of spirit.