

A reading of Heidegger's phenomenological hermeneutic of the history of Being in
support of the didactic relevance of philosophy to science education

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ABSTRACT

Great advancements in science and technology have been coexistent with extreme environmental problems, for which now science is hailed to be the one way out of these very problems; yet these problems really come about during the time when knowledge proper can only be scientific. Then it is proper to ask questions such as What is science? How does science proceed? What does it mean that science is objective?

These are philosophical questions that the time in which we live almost imposes on us. Reflecting on these questions and their answers, I believe, is a process that can greatly improve the practice of science. In this sense, I believe science education should engage questions of a philosophical nature.

The aim of this thesis is then to promote the relevance of philosophy in science education. Yet philosophy is mired in a multiplicity of approaches and fields of inquiry. Indeed philosophy has been said to be the moment when, in each epoch of humanity, the same questions, regarding the nature of knowledge, of reality, of life, of all that is, come to be contemplated and given different historical answers.

In order to clarify the historical tradition of Western philosophy and its relevance to science education, I engage the work of Martin Heidegger because of the scope of his approach which properly engages the fundamental and leading question of all philosophy, knowledge, and existence itself, that is, the question regarding Being.

It is precisely on this point, that philosophy proper stands ground for all science, that I engage Heidegger's phenomenological hermeneutic of all Western philosophy which aims to trace the historical answers that Western humanity has given to the question of Being.

It is through a reading of Heidegger's phenomenological hermeneutic of the philosophical tradition of the West, his history of Being, that I make the case for the didactic relevance of such history of Being, in that it can provide a clarification, perhaps even the essential structure, of the intellectual, scientific framework in which we all stand as modern humanity.

Indeed, Heidegger's reflections have great pertinacity, not only in the answers he provides, but in his constant questioning regarding the most fundamental issues that still face Western humanity.

ABBREVIATIONS OF HEIDEGGER'S WORKS USED IN THIS THESIS

- BPOP *The Basic Problems of Phenomenology* A. Hofstadter, trans. Bloomington: Indiana University Press, 1988.
- BQOP *Basic Questions of Philosophy: Selected "Problems" of "Logic"* R. Rojcewicz and A. Schuwer trans. Bloomington: Indiana University Press, 1994.
- BT *Being and Time* J. Macquarrie and E. Robison, trans. New York: Harper & Row, 1962.
- BW *Basic Writings* David Farrell Krell Ed. New York: Harper Collins, 1993.
- FS *Four Seminars* A. Mitchell, and F. Raffoul, trans. Bloomington: Indiana University Press, 2003.
- KPM *Kant and the Problem of Metaphysics* R. Taft trans. Bloomington: Indiana University Press, 1997.
- HCT *The History of the Concept of Time* T. Kisiel, trans. Bloomington: Indiana University Press, 2009.
- DT *Discourse on Thinking* J.M.Anderson and E. H. Freund trans. New York: Harper and Row, 1966.
- ID *Identity and Difference* J. Stambaugh trans. Harper & Row Publishers, 1969.
- PIKCPR *Phenomenological Interpretation of Kant's Critique of Pure Reason* P. Emad and K. Maly, trans. Bloomington: Indiana University Press, 2007.
- PLT *Poetry, Language, Thought* A. Hofstadter trans. New York: Harper & Row, 2001.
- PM *Pathmarks* W. McNeill ed. Cambridge: Cambridge University Press, 1999.
- QCT *The Question Concerning Technology, and Other Essays* W. Lovitt, trans. New York: Harper Perennial, 1977.
- TEP *The End of Philosophy* J. Stambaugh trans. New York: Harper & Row, 1973.
- WT *What is a Thing?* W.. B. Barton and V. Deutsch, trans. Henry Regnery Company 1967.
- ZS *Zollikon Seminars* M. Boss ed. F. Mayr and R. Askay, trans. Evanston: Northwestern University Press, 2001.

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In Metaphysics reflection is accomplished concerning the essence of what is and a decision takes place regarding the essence of truth. Metaphysics grounds an age, in that through a specific interpretation of what is and through a specific comprehension of truth it gives to that age the basis upon which it is essentially formed. This basis holds complete dominion over all the phenomena that distinguish the age...One of the essential phenomena of the modern age is its science.

Martin Heidegger, *The Age of the World Picture*

CHAPTER 1

Introduction

In an educational setting when discussing ways to more effectively face and solve environmental problems, the most invoked solution focuses on how to improve the effectiveness of science education at all levels, from elementary to adult education.

It is a truism to say that science is the main avenue through which knowledge is gained about the natural world that surround us, the environment. Knowledge is acquired, produced through the scientific method, knowledge which then informs the processes which at all levels of society resolve in actions of individuals, groups, organizations, corporations, nations. Science is the instrument of knowledge of modern Western civilization. Improving science education will provide better scientists and more informed citizens who will help to solve or prevent these very serious and threatening environmental problems. Thus better science education is one critical element to solve environmental problems.

In the context of the expanding consolidation of Western culture over the entire earth, i.e. globalization, with the leading role and power that science yields within this forming global society, and in view of the growing sophisticated assessment of the deterioration of environmental conditions, it is critical to provide and improve science education for all students whose focus is or is not science. This is certainly happening in the widespread offering of sustainability programs and environmental courses, and in all the work done to reflect upon education in order to improve science education itself, which has fostered more interdisciplinary approaches to teach regarding environmental

issues, or specific approaches, such as the more hands-on and less text based instruction called place-based education, as one example.

Yet what comes to question here and thus directs this thesis, is that the question of science education is radicalized, in that the question here is not so much how to improve science education. The question is radicalized in asking what is science? In other words, what is that which is taught as science? Here then education is understood in its broadest sense as the teaching of all that pertains with knowledge in general, that is, with the general sense of how to gain knowledge to reach the truth regarding any matter, which in modern times means scientific facts. The truth on any matter is pursued in our times through science.

What comes to be questioned here then is, what is science? What is knowledge, in the most general sense? In the answer to this question, I intend to provide a clarification for the modern standard for reaching the truth, for what science is, as a springboard for improving science education, that is, for better ways to teach it, and practice it. This approach is warranted by the fact that there is a paradox at the core of modern Western culture. On one side, the progress of science is hailed as the highest achievement of humanity, and its results obviously speak of this progression; yet we have been facing one environmental crises after another, and are now facing huge environmental problems of our making that appear to pose a threat to the very existence of humanity, and all the life on the planet; precisely in the age when modern science arises as the sole and sure path to knowledge, to the truth.

One could argue that environmental problems do not exist, in the sense that the problems are not problems *of* the environment, of nature, they are the problems humans

have created *in* the environment, since they are caused by humans, they are our doings. Following this line of reasoning, one could simply ask: what are we doing? And what are we thinking we are doing? Given the central role that science plays in the modern world, this line of questioning leads one to ask what science is and how it operates? Reflection upon these basic questions seems only appropriate in a time when virtually all rivers in the United States are polluted, one fourth of all mammals face extinction, all the while scientific research is probing the innermost secrets of matter, in sub-atomic particle physics; and reaching out to the confines of outer space and beyond space itself, in other dimensions. How can this contradiction be? In other words, what is questioned here is how, in the middle of the astounding progress of the sciences, are these dire environmental problems possible?

What is questioned here then is not how to improve science education, but, before that, what comes to question is science itself. Here science is not considered as one cultural phenomenon among many within Western culture, but the defining event of modern Western culture. After all, knowledge today is arrived at, is produced, through science, not art or religion. How are decisions made regarding any state of affair regarding any matter? Through the best available science that an individual, group, corporation, state or group of states can command, which informs any decision to action, within the economic framework, itself scientific, that establishes the values of costs and benefits for any particular action.

In asking regarding science itself, this questioning must necessarily turn to philosophy since, historically, philosophy has provided that thinking that has reflected upon what modern science is. The guiding idea of this thesis is that to better address

science education, in view of environmental problems, focus must be returned to the fact that the roots of modern science are steeped in philosophy, that is, what goes missing in science education is philosophical discourse. Thus what guides this thesis is the attempt to articulate, in order to clarify it, the philosophical tradition that grounds, that is, that reflects and articulates what modern science is. In other words, it is in philosophy that thoughtful reflection is directed toward the articulation of what stands as knowledge proper, the articulation of the standard for the truth, so that going to the root of the question of what science is implies the engagement of philosophical reflection.

1.1 The Foundational Role of Philosophy for Modern Science and its Virtual Disappearance from Science Education

This concept, of the essential relevance of philosophy to science, is not new at all, and perhaps not controversial either: students reaching the highest level of academic achievement earn the appellation of Ph.D.. This stands for the Latin *philosophiae doctor*, i.e., Doctor of Philosophy: the explicit vestige of this historical and unavoidable engagement. As the title Ph.D. implies, philosophy played the role of the field of study whence all the positive science emanate, that is, philosophy has provided the foundations upon which scientific endeavors are grounded, that is, justified as valid, as truthful, beyond and above all practical results, so that the proceedings of scientific practices is assured to be the sure path to the knowledge of the world, of nature, of the universe.

Martin Heidegger (1889-1976) points out that “The greatness and superiority of natural science during the sixteenth and seventeenth centuries is because all the scientists

were philosophers” (WT, 67), that is, all the major scientists of the sixteenth and seventeenth century were also philosophers, just like today's scientists whose researches happen at the cutting edge of their fields, where scientific revolutions happen, are necessarily engaged in philosophical thinking, that is, they are forced by the results and the questions of their researches to engage in philosophical thinking. For instance, in the book *The Quantum Enigma*, Rosenblum and Kuttner recount their meeting with Einstein as “two awed physics graduate students”. They write,

Soon Einstein asked about our quantum mechanics course. He was pleased that we used David Bohm’s text and asked how we liked Bohm’s *philosophical* treatment. We couldn’t answer. We’d been told to skip that part of the book and concentrate on the section titled, ‘The Mathematical Formulation of the Theory.’ Einstein persisted, but the issues that concerned him were unfamiliar to us. Our training was on the use of the theory, not its meaning (Rosenblum, and Kuttner 2006, 9).

This anecdote appears to well illustrate the current paucity of philosophy in science education. Science inherently belongs to philosophy, as it will be clarified and articulated below, so that in this sense, it is an oxymoron to speak of philosophy of science. Philosophy is here understood as the founding moment of science. Here philosophy is understood through the words of the thinker of modern metaphysics, Rene Descartes (1596–1650) when he wrote, in a letter “Thus the whole of philosophy is like a tree, the roots are metaphysics, the trunk is physics, the branches that issue forth from the trunk are all the other sciences...” (PM, 277). Philosophy pertains with what today are called the fundamental assumptions regarding the nature of reality, which historically have been delineated in that kind of philosophy called metaphysics, when, in the attempt to articulate these fundamental assumptions, reflection is directed toward what is mostly true regarding reality, and thus what reality essentially is, and thus how knowledge regarding it can proceed. Metaphysical assumptions pertain to the realm in which a

“decision takes place regarding the essence of truth” (QCT, 115), that is, when reflection concerning “the essence of what is” (QCT, 115) takes place.

We have been standing for a long time in the positivist understanding that science overcomes metaphysics, as Bortoft puts it, in “the widespread belief that modern science has liberated human knowledge from metaphysics” (Bortoft 1996, 180), and that metaphysics is superseded by epistemology. August Comte (1798-1857), who conceives science as positivism, and as the last stage of a progression from theology, to metaphysics to science, writes “every hypothesis that strays beyond the domain of the positive science can merely occasion interminable discussion, by pretending to pronounce on questions which our understanding are incompetent to decide” (Dilworth 1996, 71). Yet Dilworth appropriately comments that “In spite of this view of metaphysics, however, Comte claims elsewhere that ‘the human mind could never combine or even collect observations unless it were directed by some precisely adopted speculative doctrine’” (ibid., 71). In this regard, Dilworth quotes Agazzi who writes

Science...can not be pursued without one’s using certain criteria of intelligibility which are prior to the specific tasks it involves. In fact, every advancement of some science which has been presented as a 'liberation from metaphysics' has actually been tantamount to discarding a *particular* metaphysical framework and accepting (often unconsciously) a different one...Therefore it is much more reasonable to be aware of the metaphysics one has, rather than have a metaphysics without knowing it (cf. Agazzi (1988) (Ibid., 71).

Metaphysical assumptions are criteria of intelligibility that have to be there for science to proceed at all.

In other words, each science in order to proceed at all must define, must posit the nature of the entities, it proclaims as its domain, so that those entities can to be found at all, and thus can be approached, engaged in the specific ways in which their nature is understood. In this regard, Thomson writes that “botany relies on an ontological

understanding of ‘the vegetable character of plants’, physics on ‘the corporeality of bodies’, zoology on ‘the animality of animals’, and anthropology on ‘the humanness of humanity’ every positive science presupposes such an ontological posit, a background understanding of the being of the class of entities it studies” (Thomson 2005, 107).

In a recent web published interview Thomson, articulating this fact that each science presupposes such ontological understanding, i.e., such metaphysical assumptions, says that

Biologists tell us how life functions, psychologists discover how consciousness works, and historians explain historical events...but researchers in biology, psychology, and history do not tell us what life *is*, what consciousness *is*, or what history *is*. Researchers presuppose rather than answer these ontological questions; indeed, they must have already answered such questions simply in order to be able to pick out the appropriate object-domain to study. A historian, for example, already has to have some sense of what history *is* in order to sort those artifacts and events destined for history books and museums from those headed for oblivion” (Thomson 2006).

It is in philosophical reflection, that “the appropriate object-domain” is delineated. In other words, philosophy, as metaphysics, is one essential dimension of all science, when reflection regards the nature of the entities under study, articulating the assumptions that make them intelligible, so that they are perceived and comprehended precisely as the entities that they are so understood to be, that is, as they are assumed to be. In other words a philosophical, that is, an ontological moment belongs to each and every science. And in a more general sense, philosophical reflection, metaphysics, is the questioning when the fundamental assumptions regarding the nature of reality are considered and articulated. In other words, what comes under question here are not the assumptions that define what history, or biology, or ecology are, which then guide all research in these fields, indeed, a philosophical moment; what is asked here regards what fundamental assumptions regarding the nature of reality must be in place, must be assumed to be, so

that science is understood as the way to learn about reality, that is, how reality is to be fundamentally conceived and experienced so that it can be learned about scientifically?

As the opening quote points out, it is in metaphysics that a decision takes place regarding how entities are to be approached, that is, assumed to be, not solely in the definition of their nature, of their belonging to this class or as that kind of entities, in this or that domain of the sciences, but as entities, as all the entities that are, as the whole of reality, as all that is, as what is. The assumptions here pertain to the approach embracing the totality of all entities, and which then provide the guidelines for the characterization of that which is true, real, existent versus that which is not real, and thus non-existent. This is the field of philosophy proper, of metaphysics, what Descartes, and Aristotle before him, called first philosophy, and indicated as the root of all the sciences.

In Western philosophy, this is also called ontology, from the Greek *ontos*, being, and *logos*, the study of being, that is the study of the nature of all beings. That is to say that, in first philosophy what is asked is not what a cow, or a car is, that is, what is the nature of cows, or the nature of cars. What is asked about is “what is a being?” “What are beings?” How can one characterize beings as beings, that is: what we understand the nature of all beings to be? What is asked about is what is understood in this word: being (entity) which stands for all beings, all entities, as we say today, all things. What is a thing? What are beings? What does one refer to when one says: entity, thing, being; what are the assumptions that guide the definition that defines that which is real in the most general sense of these very general words: beings, things. So that out of this basic knowing, beings can be found at all, and any further knowledge regarding them, in their further definitions as living beings, as inanimate beings, as historical beings, etc., can

proceed.

The guiding idea of this thesis is that what goes missing in science education is indeed philosophical discourse, specifically as metaphysics, as ontology, as first philosophy. Historically philosophy has been essential to the rise and development of the sciences, and it still does to this day, yet in science education, philosophy has lost the explicit primacy of the role it still plays, as the Einstein's anecdote illustrates. Philosophy, understood as metaphysics, as ontology, which are here understood as synonymous, underpins all scientific endeavors. The attempt is made here to articulate the historical metaphysical grounding of science, in order to bring clarity regarding what science is, in the context that science defines our time, since science is the way to the truth of our time, indeed a time of great scientific advancements and at the same time of great and challenging environmental problems.

Currently philosophy has, for the most, a peripheral position in academic scientific studies, and its lack of coherence and generally accepted content makes it very difficult to approach. In a contemporary academic setting, philosophical engagement of science takes many forms. In its barest, it is the study of the scientific method, which has been characterized as science itself. The role of philosophy in relation to modern science is beset by different and polarized approaches, and like all matter philosophical there are many divergent perspectives on what that role is, exactly. There is a lack of a unified approach in philosophical matters. What today is called the philosophy of science is composed of various currents and approaches, such as positivism, realism, empiricism, analytic philosophy, epistemology, the history of science.

Currently the philosophy of science holds a supporting role in clarifying the

language and its structures belonging to the thinking involved in science, like logical positivism has claimed; or in the clarification of the methodology through which scientific knowledge is produced, epistemology; or in the clarification of the ethical issues that arise with scientific research or scientific applications; or in the clarification of the categories of thought, of the values, that define the assumptions that delineate our perspective, our views of the world, our worldviews. Yet it can be asserted with certainty that philosophy, understood as metaphysics, as ontology, as first philosophy has lost its centrality in the contemporary scientific educational setting.

In modern culture, science is viewed as the highest point of human achievement. Science is usually contrasted against and over Scholasticism-the Church doctrines, and Greek philosophy and mythology. Thus science is considered the overcoming of previous eras, in a positive progression-mythology, religion, science-that aims and reaches out toward the complete and comprehensive knowledge of the universe. In this sense, science is not one phenomenon among others, modern science lies at very core of modern culture.

In witnessing the great successes of the sciences, it may seem irrelevant to speak of the relevance of philosophy, but in view of the concomitant environmental problems, it is reasonable to propose that the study of the metaphysics, of the ontology that lies at the base of the modern sciences, could help assess ways to approach and resolve the environmental problems of our time. The claim here is that more philosophical savvy students could help them on the way to provide answers to the constant threat of environmental crises, and thus to address the paradox of how a civilization such as modern Western culture, can be so scientifically advanced, and yet plagued by so many environment problems at this time, without recurring to the usual explanations of plain

human greed, foolishness, ignorance, and hubris, which indeed are all present; or to concepts such as unintended consequences and market externalities. We simply and squarely ask, what is science? What is this metaphysics that roots all the sciences, of which Descartes wrote about? This question is asked knowing that this is not a particularly popular position. As Dilworth writes, in 2006, in his *Metaphysics of Science*, “few modern writers would want to say that science has metaphysics at all” (Dilworth 2006, 1). Yet as all matter philosophical, this is left to the personal inclinations of each individual.

In one lecture of the core courses in the Master of Environmental Studies, here at the Evergreen State College, professor John Perkins stated that science is based on metaphysical assumptions, and these cannot be proven right or wrong. We were then instructed to read Kuhn's *The Structure of Scientific Revolutions*. In it, Kuhn articulates that the progression of science happens through scientific revolutions, that is, progress in science is not linear, nor cumulative, but is destructive of previous positions, which are usually incommensurable with new ones.

Now, against the assurance of positivism that knowledge resolves in the mere ascertaining of facts, and their accumulation, Kuhn describes a situation in which basic concepts direct the field of study of a science. These ontological assumptions regarding the nature of the entities are posited in advance, in that they provide an insight about the nature of the phenomenon under study. These ontological insights, these basic concepts, clarify the nature of the entities under study, so that they can be engaged experimentally, in research, in problem-solving. When experiments confirm such ontological hypothesis, in which ever ways this happens, the ontological assumptions are strengthened, they are

temporarily confirmed, they become paradigmatic for the practical proceeding of the study of that particular phenomenon, fundamentally understood and engaged from these basic concepts and concurrent experimental practices.

John Horgan, interviewing Kuhn in *The End of Science*, writes that Kuhn traced his view on science to an epiphany he experienced in 1947, when he was working toward a doctorate in physics at Harvard. While reading Aristotle's *Physics*, Kuhn had become astonished at how 'wrong' it was. How could someone who wrote so brilliantly on so many topics be so misguided when it came to physics? / Kuhn was pondering this mystery, staring out his dormitory window, when suddenly Aristotle 'made sense'. Kuhn realized that Aristotle invested basic concepts with different meanings than did modern physics. Aristotle used the term *motion*, for example, to refer not just to change in position but to change in general—the reddening of the sun as well as its descent toward the horizon. Aristotle's physics, understood on its own terms, was simply different from, rather than inferior to, Newtonian physics. Kuhn left physics for philosophy... (Horgan 1996, 42).

These basic concepts of which Kuhn speaks, for example the basic concept of *motion*, the metaphysical assumption that articulates what motion is, how motion is understood to be, do not find their grounding in final verification, but are the fundamental concepts in which the phenomena of reality are assumed to be, are preconceived to be, so that knowledge about them, so understood in these concepts, can proceed and expand. As will be delineated in detail below, the way the phenomenon of motion is understood lies at the base of the arising of modern science as physics; and the way motion is understood to be by modern physics is not inherently better than how it was understood in ancient Greece by Aristotle, as Kuhn realized. In other words, the reddening of the setting sun or blushing were kinds of motion to Aristotle, while at the beginning of modern physics, motion is understood properly and exclusively as the movement of position, as locomotion, which is not inherently better nor more profound, but simply different.

What this thesis proposes is that what is missing in science education is the

philosophical, that is, metaphysical, ontological dimension of science. That is to say that science education is not here addressed in view of the betterment of the communication and passing of scientific knowledge, but education is here considered in view of the assumptions that are at the base of knowledge itself, of scientific knowledge in general, the moment when thoughtful reflection is focused on the decision regarding that which is to count as knowledge at all, that is, regarding the standard against which the truth regarding any matter is to be assessed.

Philosophy is indeed this taking a step backward, stepping backwards toward the ground, taking a radical approach to the theme under scrutiny, in the sense of going to the roots of the matter, to the nature of the things, to the fundamental concepts that illuminate reality, as reality *is*. Taking such a radical approach to these matters brings one to confront and thus question the most basic and general framework of understanding in which all activities and events are meaningfully placed in an interrelated whole of intelligibility giving meanings to all things, situations and events. Philosophy is in Western culture the realm where the general assumptions regarding the nature of reality are attempted to be made transparent, and thus the decision regarding the essence of truth is here articulated, that is, in the works of philosophers.

1.2 Why Heidegger? The Question Regarding Being

The lectures of German philosopher Martin Heidegger (1889 – 1976) provide the core of our exposition. Heidegger's meditations will guide us toward an answer to the question of what science is, in the articulation of the relation between philosophy and science, their

covalent bonding. Heidegger approaches the question of the metaphysics that sustains modern science, in view of what he considers the most fundamental question of Western philosophy: the question of the being. For Heidegger the fundamental and guiding question of philosophy is the question regarding the meaning of the being, which from here on will be capitalized, as Being or rendered as the being, in order to differentiate it from a being, that is, an entity. In the Western metaphysical tradition Being is the most comprehensive term to signify all that is, nature, reality, existence. For Heidegger to account for Being is the propelling, questioning force of all philosophy proper.

In *Why Reawaken the Question of Being*, Grondin writes that “According to Heidegger, the question of Being is the absolutely fundamental question of philosophy, but also of existence itself. No one before Heidegger had truly defended this very strong thesis”, which is the linking of “the most primordial question of philosophy to the question that man is for himself, as soon as he finds himself confronted with the question of Being and its meaning. However, Heidegger’s more complete and rather mischievous thesis is that the question of Being is one before which *both* man *and* philosophy tend to flee, for it is a destabilizing question, a question that tends to dissolve every certitude” (Grondin in Polt 2006, 15).

Heidegger explicitly returns to what he considers the questioning core of all philosophy and life itself, the question regarding the being: “How does it stand with Being?” For Heidegger, at its core philosophy as metaphysics, as ontology, as first philosophy, is this questioning. The question regarding Being, Heidegger considers, asks about our fundamental understanding of Being which factually guides, orients us toward everything that is. In all that we do, think, and feel, without and before having to be

expressly clarified, but as from the silent background of obviousness, the meaning of Being must be present for us, so that one can say, “there it is” and know exactly what the “is” means.

Heidegger brings to the fore the fact that as Rojcewicz puts it “the understanding of what it means to be is the general notion in terms of which we can grasp any particular being. Any particular being can be grasped only if Being in general is already disclosed to us” (Rojcewicz 2006, 136). In other words, Heidegger contends that in order to engage knowingly, to comport oneself toward any being whatsoever, an understanding of what it means to be, must already be operative.

In this sense, Heidegger considers philosophy as that fundamental questioning regarding the most general and basic conceptual framework which aims to delineate the present manifestation of all that exists, all that is in being, in reality, in existence to a human being. Philosophy is that questioning that questions regarding the fundamental understanding in which the presence of anything is rendered intelligible, recognizable, and meaningful in and by the very sense given to the meaning of Being, the being in general, that is, of all beings.

Heidegger considers that what comes to the fore in this fundamental questioning is the standing of the being that is questioning, the human being. In other words, we are beings among all other beings, and we are that being who can raise the question regarding what it means to be; indeed, for Heidegger it belongs to the human being as human being to be such an understanding of Being. Thus in the clarification of the understanding of Being, what is at stake is not only the ontological standing of all that is, of the sense of Being in general, of nature in the most general sense, that is, of what is real and truthful,

what is also at stake in this questioning is the nature of the one questioning, the human being. In questioning and articulating the nature of reality for all beings, the human, as a being among beings, confronts also its place in reality, that is, its fundamental nature, the self-understanding of the being that is human is also at stake.

When the question of Being is asked, the question regards not only all the beings that are, but also the being that is human, the peculiar being who is the one asking regarding Being. For Heidegger points out that the human being, for each one of us, our life, our being is of concern to us, for the being that is human, its being, and thus being in general is an issue, is of concern. Thus the question of Being does not pertain only with the question regarding the nature of reality, which pertains with the knowledge of nature, the universe, of all the beings there present, it is also the closest question for the one asking regarding Being. It is in the answer to this question that, that which is closest to the human being is decided. In this all-inclusive question, the assumptions that allow, direct, guide the intelligibility of any being encountered by a human being as to its reality come to be questioned. But in this questioning a special question confronts one: the question regarding the being that is human, the one being who is questioning regarding the meaning of Being, that is, regarding the nature of all beings.

1.3 The Human Being as Understanding of Being

The Understanding of Being as pre-ontological, that is, pre-philosophical

For Heidegger the human being is essentially an ontological being, which does not mean that the human being can think ontologically in a theory of ontology but rather, Heidegger writes, “being in such a way that one has an understanding of Being” (BT, 32).

By understanding Heidegger does not mean merely the capacity to grasp the meaning of something, a situation, or a fact, as a property possessed by the human, but as the constitutive element of the human being, inherent in humans as humans, to bring meanings into the open, to bring beings to be disclosed in the meaning of Being, disclosing beings in the indication of what and how they *are*. Such capacity, as essentially constitutive of the human being, is pre-ontological in that the human being has an understanding of Being before any ontology is expressly articulated.

In other words, the understanding is that capacity that makes it possible for us to cope and deal, factually and practically, with anything at all, that is, not only the understanding of each individual item in the world or of the totality of the items of the world, but the possibility to signify the presence of beings, to be meaningfully in the world, that is, to be in a nexus of meaningful relationships to beings that always reference to each other in a comprehensive whole, in which we directly act and move with other beings.

That is, the understanding is not primarily theoretical but prior to that, it permeates all compartments, all behaviors and interactions with beings and oneself. All these, Heidegger contends, happen in the light of the meaning of Being, that is, all beings come to a relation with us, as the beings that they are, precisely in the light of the meaning of Being. Even if this understanding of Being is not clear and self transparent, theoretically. That is why Heidegger contends that it is pre-ontological.

This understanding, this meaning of Being can be made thematic, and this happens in philosophy, in ontology, in metaphysics. These are different historical names for approaches to the question of Being, of the meaning of Being, and are for Heidegger

genuine philosophy, authentic thinking. Thus it is in ontology, in metaphysics, in first philosophy, that is articulated the meaning of Being that comes to be prevalent in a certain age, in a certain place at a certain time, in that understanding of Being that grounds that particular age.

When one questions regarding the meaning of Being, one already find oneself living within the understanding of Being of its own culture. One might even be totally oblivious to this questioning and its answers, yet ones' actions, thoughts, endeavors, feelings, and words, all moods and attitudes will predominantly all bear the stamp of the answer to the question of Being of the age, of the culture one grew up in.

That is, the understanding of Being in which a culture historically fulfills its understanding of itself and of all that is, of Being: fulfilling its understanding of Being in all its doings, all practical actions and factual ways in which a people is. It is this basic orientation that allows the intelligibility of all that surrounds us, ourselves included, and consequently allows one to interact and relate, to be with any entity at all, be it a car, a mule, or a mathematical formula, that is, any thing present for us in its encountering us. Philosophy, as ontology, as metaphysics is when these understandings of Being are articulated and made transparent, that is, reflected upon and articulated in the language that clarifies such a way of understanding Being in which a people is.

This vicinity and predominance of such an understanding of Being does not, for Heidegger, imply that this meaning of Being, paradoxically, is easy to identify. Yet it will be operative even if we are not clear about it, or even completely oblivious to it intellectually, in this case proving its guidance without being explicitly chosen, that is to say, chosen without choosing, i.e. blindly accepted. This difficulty Heidegger calls the

law of proximity. Thomson writes in this regard that “This ‘law of proximity’ (or ‘distance of the near’) states that the closer we are to something, the harder it is to bring it clearly into view and...thus that the more decisively a matter shapes us, the more difficult it is for us to understand it explicitly” (Thomson 2006, 56). Thus the understanding of Being, being the closest to us, is paradoxically the hardest to be clear about, right because of this vicinity. The question of Being is the fundamental question of philosophy and existence, yet it is the question that tends “to dissolve every certitude”, while its vicinity indeed guides one's life.

In that we are, in that we comport ourselves towards trees, cars, theorems, rooms, cats, numbers, gardens, markets, planets, ourselves and others, the nature of these beings, ourselves included, is open to us, an understanding is already operative so that we can find and meaningfully interact with these entities, in that what they are is disclosed from the understanding of Being that, even if vaguely understood, is there operative in guiding all finding and relating, that is to say, all our comportments toward everything. Thus for Heidegger if we find and relate to beings, it is because we already have a diffuse understanding of what it means for any being to be.

Yet we do not need to be explicitly clear about this understanding of Being, to act and be with the beings of the world. Indeed all beings are that which we constantly encounter in use, in handling, in imagining, in dwelling, in our constant being with them. In other words, all our interactions with beings come first, in their ordinary presence, but the question of Being, that is, the understanding of Being comes first in terms of rank, in that we must already know the meaning of Being, in order to be with anything, meaningfully, either in practical use or theoretical assessment.

To clarify, Being is here understood, using current terminologies, as the happening of reality, life, the universe, creation, evolution. Being is the most comprehensive and general term of Western philosophy, that refers to the whole of reality, from the parts to the whole and from the whole to each part, in its overall happening, that is constantly addressed by the being that is human, in which the human being *is*. As said above, Heidegger points out that the question of Being is also the closest question for the being that is human, whom itself stands in Being, as a being among other beings. Heidegger points out questioningly that when one says I am, we are, “what is closer than that?” What is closer to us than the fact that we *are*. So that in the meaning of the being, an understanding of the meaning of our being, the being that we understand ourselves to be, is already open to us, is clear for us, it must be there so one can say I am. And yet this understanding of Being “that we are” is, because of its proximity, the hardest to be clear about.

In other words, the understanding of Being of a time, of an age, Heidegger points out, is not what comes to be explicitly known in the first place. What comes to be known first are the individual entities that one encounters daily in one's endeavors, projects, work, social and personal activities, in the concerns of our daily living. Yet upon reflection one realizes that an understanding of Being is already there, always operative in the very ways in which everything is intelligibly encountered, handled, used, considered. Thus the understanding of Being of the current age might not be known first, in time, that is, temporally first, but its primacy is of rank, it must already be there for us to encounter and relate to any being at all, in the very ways beings are encountered, are intelligibly present to us, and indeed in the way we understand ourselves to be.

Furthermore, the understanding of Being sustains the sense of that which is considered knowledge proper, in that the understanding of Being also fundamentally determines that which is in Being, and thus that which is not in Being, that is to say, that here happens the most basic articulation of that which comes to be considered as true, as being true, as being real. In the meaning of Being is articulated the basis upon which one is to ascertain the reality, the truth; not the truth about this or that entity, or group of entities, but regarding the most general and standard sense of the truth for all specific truths. So that in the articulation of the understanding of Being, the meaning of the truth as truth is also articulated. For instance, if in modern times the truth is ultimately found in mathematical representing, i.e., in human representing, in medieval times the truth is found in divine revelation, in following the word of Jesus as related in the Scriptures.

1.4 An Introduction to the Question of Being

The Posing of the Question of Being

The first sentence of the published lecture *An Introduction to Metaphysics* reads “Why are there beings at all, instead of nothing?” Heidegger indicates that this can be considered the fundamental question of philosophy, a question that at some point, in some similar form has touched all of us. It is a question that asks for the reason of why there are beings at all; why beings are, the reason for the existence, the being of all that is, thus all that is can be understood in view of its origin and ground. Yet in this question, Heidegger retrieves another question there to be asked.

In the question “why are there beings at all instead of nothing?”, he asks regarding the “are there”, the fact that “beings are”, that they “are”. A being “is”, but what does the

“is” mean? What does it signify? To what is the word “is” referring to? That is, Heidegger contends that in asking the fundamental questioning regarding the why of beings' existence, why anything is at all, one should be clear regarding the meaning of the word “is”, the questioning should focus on the “is”. In other words, in the question “Why are there beings at all, instead of nothing?” the reason, the origin for all being's existence is in question, that is, it is not known, and yet supposedly we know what the “are” means.

So then what does it mean when one says that “beings are”, as when one says that “the chair is there”, or “the horses are beautiful”, what does the copula, the “is” stands for? “Is”, “are” mean to be, so that, when one says that a being is, that the chair, the horses, the equation, the rainbow are, clearly one then must know about the meaning of the word are, that is, the meaning of the verb to be.

Heidegger properly and obviously accesses philosophy through language, but not as linguistics, or logic, but in view of the very direct, basic, and simple fact that language brings that which it names to an indicated presence for the one who speaks. Regarding words, and language, Heidegger writes “for words and language are not just shells into which things are packed for spoken and written intercourse. In the word, in language, things first come to be and are. For this reason, too, the misuse of language in mere idle talk, in slogans and phrases, destroys our genuine relation to things” (IM, 15). For Heidegger, words are not just wrappings to existing objects and things, in language, the existence of the things themselves is brought to intelligible presence through the meaning that indicates, signifies the thing, the situation, the event one is talking about, i.e. it makes them known, present for us as to what they are, how they are, in the richness of all that which is spoken to pertain to them, their being there.

Thus Heidegger can say that language manifests reality, in the sense of making things intelligibly present to a human being, in the clarity of its articulated knowledge of them, not only as this kind or that kind of beings, but in the knowledge of beings as beings, that is, in relation to their being there at all, that is, in the sense in which the verb to be is experienced and understood.

The understanding of Being happens in living, in the ordinary ways in which we speak of and are involved with beings that are. In asking regarding the meaning of the verb to be, that is, in questioning to what the verb to be refers to, the articulation of the answer happens in words, in language.

Keeping in mind this fact, that words refer to something they symbolize, and in this referring to, for Heidegger, they bring it to an intelligible manifestation, in the known presence of things to us, as one can say of something “there it is”, in the case of the word Being, to which phenomenon does the verb to be refer to? That is to say, what does to be, Being signify? When, in speaking, one uses the verb to be, what does one signify, what does it mean to be when one says “there is the answer”, or “that is not true” or “there is the mall” or “this is our dream” or “I am”. The answer, the falsity, the mall, the dream, oneself “are” specific beings, we can point to and define, but what does the “are” mean, to what do we point to?

Grammatically, Being is the gerund of the verb to be. The gerund is, as a dictionary states, “a noun formed from a verb, denoting an action or state”, like eating, walking; but how does it stand with the gerund form of the verb to be? The noun of the verb to be, Being, is that activity or state that constantly happens and that is indicated anytime we say that something “is”, and indeed Being precedes the possibility of such

saying. Heidegger points out that the verb to be, Being, stands for no ordinary and disposable activity, to the point that if this verb would be taken out of language, language itself would collapse.

In other words, how do we account for the “are”, for the verb to be, for Being? But can this answer even be formulated at all, is the expression “Being is...” just a nonsensical proposition? Since one is trying to know regarding Being by saying that Being “is...” through the “is”, that is, through that which one is asking about. Heidegger suggests that in so doing, in saying that “Being is...” we would make Being into a being, of which one can say how it is, or what it is, or if it is or it is not. But as Heidegger points out Being is not an entity, it is not *a* being. The being, Being, is not a specific entity, but Being is the general existing of all things, of all entities, of all beings, physical and not; present, past, and future. Being includes any being: a chair, an idea, a proton, an odor, a formula, a prophesy, a fantasy, a theory, a dinosaur, a human, a fact of which one says that it “is”, and yet, Heidegger observes, Being is not a specific being or the sum total of all beings, even though can be and is that too.

Drawing attention to the importance regarding how questions are formulated, in that their formulation already begets certain answers in containing implied knowledge regarding the questioned matter, Heidegger writes that “Every question specifies as a question the breadth and nature of the answer it is looking for. At the same time, it circumscribes...the range of possibilities for answering it” (N IV, 206). So that Heidegger asks not What is Being? Since that question would look for a something, for an entity, but Being is not an entity, thus the question Heidegger asks is How does it stand with Being?

1.5 The Proper Formulation of the Question of Being

When asking regarding the “is” in the statement “a being is”, we are asking regarding the “is” of a being, replacing “is” with Being, Heidegger clarifies that we are asking about is the Being of a being. In this regard, Thomson writes that

Metaphysics asks what it means for an entity to be, and understands the answer to this question as 'being'. For Heidegger, however, the answer to the question of what entities *are*, which metaphysics takes as 'being,' really needs to be understood more precisely as 'the being of entities [*das Sein des Seinden*].' This Heideggerian locution may sound odd initially, but really it is a fairly straightforward philosophical clarification. Asking what entities *are* (or what an entity *is*) means asking about the *being* of those entities. As Heidegger puts it: 'Whenever it is said of entities, the little word 'is' names the *being* of [those] entities'...To establish an answer to the question 'what is an entity' metaphysics makes a claim about what (and how) entities *are*, and thus about the *being* of those entities (Thomson 2005, 12).

Consequently, in questioning why there are beings at all instead of nothing, in this questioning the clarification of the indicative meaning of the “are” in “there are beings” comes to be the focus, and indeed the question and answer regarding the Being of beings is to be known so that it is possible to ask the question regarding the why of the Being of beings. In asking why beings are at all, one must first come to clarity regarding the fact that beings “are”, that is to say, regarding the Being of beings.

Heidegger thus poses the guiding question of philosophy, as the question regarding the Being of beings, what today is usually formulated as the question regarding the “nature of things” or the “nature of reality”. Yet asking regarding the Being of beings is the more direct, general, precise, and historically cogent way to formulate the question. Since the ancient Greeks, Being is the most general category of Western philosophy, Being is all that is, delimited only by not Being, the nothing. In other words the question of Being is all inclusive, and properly belongs to the core of Western culture, from the archaic Greeks to modernity.

Heidegger returns to the fundamental question of Western philosophy, the question regarding the fact that beings *are*, that is, regarding the Being of beings. The question regarding the origin of beings, why beings are, is the question regarding the origin for the existence of all beings, and thus the question regards the fact that beings presently exists, in that they are, in what they are and how they are, that is, the question asks regarding the Being of beings.

Thus the question regarding why beings are at all instead of the nothing, is based on the previous knowing of the Being of beings. Indeed the verb to be infuses all our ordinary talking in such an obvious way, that this implies that an understanding of the Being of beings is already known, so that when we say that beings *are*, the “are”, the Being of those entities is already understood. Heidegger contends, at the beginning of *Being and Time*, that the obviousness in which the meaning of Being is held means not that is clear and transparent to us, but that it is not questioned anymore, and so it becomes the task of philosophy to question regarding this obviousness, that is, to question regarding the Being of beings.

1.6 The Approach to the Question of Being

The Question of Being as Being and as Onto-Theology

Heidegger attends to the consideration that the fundamental question of philosophy is the question of Being. Heidegger retrieves the question of Being, the guiding question of all metaphysics, in reading Aristotle (384 BC – 322 BC), who realized that there are different ways to approach this question, and for such a fundamental question this is peculiar. For instance, Aristotle asks the question of Being,

as the question of Being as Being, but the question of Being can also be understood as the question of the Being of beings, or as the question of the Being as a whole.

Thomson writes, in this regard, that Heidegger retrieves two fundamental components of any fundamental metaphysical position “an understanding of entities 'as such' and an understanding of the 'totality' of entities” (Thomson 2005, 12). In other words, the question that aims to account for the Being of all beings, the question that asks about the existence of everything in the most general sense of the being of everything, comes to be articulated from the very beginning of metaphysics in classical Greek philosophy, in Plato and Aristotle in a twofold manner.

Heidegger's focus on the whole Western philosophical tradition uncovers a fundamental structure that is found throughout Western metaphysics. That is, from the very beginning, Western metaphysics unfolds in a twofold structure. Heidegger writes that

if we recollect the history of Western-European thinking once more, then we will encounter the following: the question of being, as the question of the being of entities, is double in form. It asks on the one hand, What are beings in general, as beings? Considerations within the province of the question come, in the course of the history of philosophy, under the heading of ontology. The question 'What are beings?' includes the question, 'Which being is the highest and in what way is it?' The question is about God and of the divine. The province of this question is called theology. The duality of the question about the being of beings can be brought together in the title 'onto-theo-logy.' The twofold question, What are beings? Asks on the one hand, What are (in general) beings? The question asks on the other hand, What (which one) is the (ultimate) being? (PM, 340) .

In other words, Heidegger points out that the question of Being asks regarding the Beings of beings, and this questioning manifests in a twofold manner. The being can be understood as that which is common to all beings as beings, “in the sense of the foundation”, that is, ontologically; or the being can be understood as that which is the

highest being “in the sense of that which allows all beings come into being”, that is to say, theologically (PM, 340), which does not have to be understood necessarily religiously.

Yet for Heidegger, the fundamental question for philosophy, that precedes the onto-theological structure of metaphysics, is the question of Being as Being (IM, 20), or as he also articulates it, as the question of Being as such and as a whole. Heidegger writes that “Because metaphysics interrogates beings as beings, it remains concerned with beings and does not turn itself to Being as Being” (PM, 278).

In other words, the onto-theological approach aims to define the Being of all beings, and ultimately comes to reference the question of Being to a being, the most common and the most supreme, as constitutive for all beings. Heidegger contends that only the pre-Socratic, the most ancient philosophers held the question of Being in no onto-theological manner, but in a unitary sense, that is, in an experience which coalesced the Being of beings, the Being of the human, and the Being of the whole as one, that is, as Being. In other words, for Heidegger after the archaic Greek philosopher-poets, that is, the pre-Socratics, this fundamental questioning constantly moves away from this unitary sense in which it was experienced and thus questioned, and it becomes articulated as onto-theology, by making Being a being-the most common and the most supreme,

In other words, Heidegger contends that in the question regarding the Being of beings, approached onto-theologically, as legitimate and fundamental this questioning is, another more primordial question arises in differencing between Being and beings. That is, for the archaic Greek philosophers the question is approached in experiencing Being as the intelligible disclosing of everything that *is*, as each separate being, and as the

whole of beings, and yet, at the same time, Being as Being hides itself, that is to say, that Being as itself, the happening of Being itself is imponderable; as Heraclitus (c. 535 – c. 475 BCE) puts it, “Being loves to hide”, and yet it discloses all that which manifests: that is, the intelligible presence of beings, that is, the Being of beings.

Heidegger retrieves that still with Aristotle the question of Being as Being is asked, as Aristotle does, but is not contemplated anymore, it becomes right away, implicitly understood as the question that approaches the question of Being in the double sense of asking regarding the Being of beings, that is, regarding the most common state of the being for all beings; and regarding Being as a whole, that is regarding the most supreme state of the being for all beings. Thus for Heidegger metaphysics, which can be said to start with Plato and Aristotle, shrinks back from the question of Being as Being, by the way of the onto-theological approach to the question of Being. All metaphysics, after that, as Heidegger articulates throughout his lectures, is etched in this onto-theological framework.

1.7 Metaphysics as Onto-theology Articulated in a Set of Basic Concepts: the Categories

Furthermore, starting with Aristotle, philosophy as metaphysics, as onto-theology, understands itself to answer the question of Being through the characterization and articulation of fundamental concepts: the categories, such as form, matter, substance, time, space, quantity, quality, change, motion, soul, mind, reason, object, subject, etc., which define and clarify the Being of beings, and Being as a whole. That is to say, the categories aim at the articulation of Being in view of beings, in the most common and the

most supreme being, without consideration to the question of Being as a whole and as such a whole, that is, of Being as Being.

Again, drawing from the observation that in the way any questioning is set up an understanding of the matter questioned is already in place, that is to say that, in the way the questioning approaches its subject matter, it already brings about an orientation regarding that which is asking about, thus it brings with it a range of possible answers obtainable in this orientation. Heidegger contends that the approach of all metaphysics does not lead toward Being as Being. Yet this onto-theological approach that looks for fundamental categories, for basic concepts, it is not a mistake, as Heidegger points out “the twofold quality of the question about beings must result from the way the being of beings manifests itself” (PM, 340). That is to say, this approach is not understood as an insufficiency of metaphysics, as the accounting of Being in basic concepts, in fundamental categories: for Heidegger metaphysics is the onto-theological shrinking back from the question of Being as Being.

The onto-theological approach to the question of Being, becomes the implicit approach to the question of Being, in the articulation of the most fundamental categories of metaphysics, of ontology, that articulate the Being of beings. Thus metaphysics, aiming to articulate the Being of beings, establishes all the categories that guide and systematize, as foundational, the comprehension of all that which is into one comprehensive scheme. Thus all metaphysics and ontology happen within the approach to the question of Being, which looks for basic categories that define the Being of beings, in an onto-theological approach.

Thus Heidegger contends that “Basically, all ontology, no matter how rich and

firmly compacted a system of categories it has at its disposal, remains blind and perverted from its own most aim, if it has not first adequately clarified the meaning of Being, and conceived this clarification as its fundamental task” (BT, 31). Heidegger refers to this fundamental task in *Being and Time* as “fundamental ontology”, which for him is the ultimate task for thinking, for philosophy. All Heidegger's work claims its devotion toward this question, with no claim to its answer, but to work toward the preparation to re-open the question of Being, first in the clarification of the onto-theological approaches of metaphysics, in order to ultimately approach the question of Being as Being.

The question which Heidegger considers fundamental to philosophy, the question “most worthy of thinking”, is the question of Being as Being. For Heidegger metaphysics, as onto-theology, precludes such questioning to be asked, even though it is indeed driven by the question of Being, which it avoids by taking right away an onto-theological approach.

Heidegger points out that even if Aristotle initially asks the question of Being as Being, right away he makes Being into a being, the most common and the most supreme, the onto-theological framing of the question of Being. Aristotle is, for Heidegger, the first to be explicit about it. This onto-theological approach, Heidegger contends, remains throughout the history of metaphysics, to which even Nietzsche, who wanted to do away with all metaphysics, unknowingly abides to, in the two fundamental concepts of Nietzsche's philosophy: will to power and the eternal return of the same, as will be articulated below.

To summarize, for Heidegger, philosophy as metaphysics, takes an onto-theological approach to the question of the Being of beings. Ontology asks regarding the

ground for all beings as a common denominator that constitutes the Being of all beings; theology asks regarding what is supremely Being that allows beings to emerge out of their common ground. Like a pyramidal structure whose base is the Being of beings, the most common denominator, and whose apex is the supreme being, the highest being: metaphysics articulates in basic categories the circle covering base and apex. For instance in modern metaphysics this structure, as will be articulated below, takes the form of the objectivity of the objects and the subjectivity of the subject, respectively. Yet Heidegger contends that ultimately the question for philosophy is the question regarding the circle as itself: Being.

For Heidegger the question of Being is throughout metaphysics approached in view of beings, unavoidably so, that is, the existence of beings must be accounted for, and this happens in fundamental concepts, that is, other beings, that is, these concepts points to fundamental beings: the most common and the supreme. But in considering the question of Being, Heidegger finds that the question is to be posed ultimately in view of Being itself, that is, of Being as a whole and as such whole. For Heidegger this questioning is the highest call for philosophy, but it is a questioning that, as Grondin puts it, “tend to dissolve every certitude”.

It is beyond the scope of this thesis to consider Heidegger's pursuit of the question of Being as Being. It is mentioned in this introduction to give a sense of the overall scope of Heidegger's thinking, and to bring to relevance Heidegger's claim to an insight in the initial understanding of Being of archaic Greece, the very beginning of Western philosophy.

In returning to the question of Being as the fundamental question of the whole

philosophical tradition of Western culture and of existence, Heidegger retrieves that after the archaic Greek inception of the question of Being, as the question of Being as Being, an onto-theological approach takes hold which is delineated in fundamental concepts, which structure the Being of beings and the Being as a whole. Thus in metaphysics, the fundamental concepts articulate the Being of beings within an onto-theological framework.

Aiming to retrieve how the question of Being has been answered in Western philosophy, Heidegger finds onto-theology. The questioning regarding Being is configured in two questions. Ontology probes regarding the most common ground of all beings, theology asks regarding the supreme being, which must not be intended solely in religious terms; philosophy articulates the basic concepts that compose all that is contained in this circle, between the ground and the supreme, the circle of the being.

In other words from Classical Greek philosophy to modern metaphysics, philosophy looks for a set of concepts that define Being onto-theologically, delimiting the overall meaning of Being that is so experienced by an age. Heidegger contends that throughout metaphysics, the onto-theologically structure remains the same, but the specific categories change, as does the way the categories as categories are understood to be, for instance in the modern sense of being conceived as values.

For Heidegger, the philosophical tradition of the West articulates the understanding of Being in the language of a set of basic concepts that illuminates beings in their Being, that is, in their most general definition of beings as beings, before they are then categorized in view of the more specific kinds of beings that they are. These categories, these fundamental concepts, the values that philosophy articulates to account

for, as Nietzsche puts it, the ultimate fact of Life, are according to Heidegger a temporal definition of the meaning of Being, that give rise to history itself. History is the way humans experience the Being of beings, which comes to articulation in philosophy.

Philosophy aims to articulate the basic concepts that delineate the nature of things in general, the ultimate assumptions, that is, the first definitions that account for the Being of beings. The Being of all beings is articulated in a succession of basic concepts that account for beings as to their Being. Thus these delineations of the Being of beings are interpretations of the meaning of Being. Thus one can say that the understanding of Being is an historical interpretation of the Being of beings.

Philosophy attempts to articulate in self-transparency the articulation of how an epoch accounts for its understanding of Being. Any epochs of history is an understanding of the Beings of beings and the language of that particular age is infused by that specific interpretation of the meaning of Being. Thus the language of an age is infused by the meaning of Being, in the sense that all ordinary talk makes implicit reference to the meaning of Being, any time one uses the verb to be, directly or implicitly. It is in the language of philosophy that this meaning is attempted to be clarified.

For Heidegger, language, as speaking, is not only a way to communicate what is already known or to predicate a thing with its attributes, etc., but it is also, more primordially, the delineation, one could say the manifestation of that which it symbolically refers to, the pointing to, the indicative function that reveals the very presence of beings, as one says today, their reality, that is, how beings are understood to be, and are thus experienced, in their manifestation, in their appearance, in their nature, that is, in their Being.

Heidegger's philosophical engagement with language pertains not to just the intellectual pursuit of the clarification of meanings, or the study of the rules of language, or of logic, but the clarification of the interpretations which open and delineate the way the Being of beings is understood, so that beings are experienced at all, engaged, dealt with, used, encountered in experience, in each epoch of Western history.

For instance, there is a fundamental difference between the medieval farmer who cuts the tree to use its wood and modern forestry. Both cut, kill, appropriate the tree for its wood, for this or that use, but the way the tree is approached, is encountered in experience is essentially different. The being of the tree for the medieval farmer and for the modern farmer span across not only a time divide but, which is the same, a metaphysical one. For the medieval farmer trees are creatures, created beings; for the modern farmer trees are biological resources, to be optimized to human needs and consumption.

The being of the tree the medieval farmer engages in use, is encountered as created by the one God, indeed, for the farmer's use, but the tree is also a being for itself in its status as a created being, a creature. Historical records from the 15th century show that, for example, when an insect infestation was happening on a specific crop, threatening the harvest of that crop, court trials were set up. The insect community that was preying on the crop, since it had a standing for itself, as created, could be summoned at a trial by giving it a human allocated representative (Ferry 1995, ix-x). In modern agribusiness insects feeding on crops are pests, and as such are treated as a threat to natural resources, and are ruthlessly destroyed with pesticides.

In modern forestry, forests turn into “timber”, whose production must constantly

be optimized by human managing directives, for human needs and profitability, or alternatively managed in conservation from exploitation, and so always in view of human exploitation. This does not entails just the use of different labels, it entails a fundamentally different approach to, definition of the being of the trees, a different definition of what a tree as tree is, i.e., of its ontological status. Furthermore this implies a fundamental conception of the being that is human. In other words, this pertains with the overall understanding of the Being of beings of different ages, one that experiences beings as “creatures”, that is, created beings, and the other that experiences beings as resources, that is, existing beings as “products” of the mechanisms of physical forces and of evolutionary forces, whose use must be constantly optimized in the planning and management of human productivity and exploitation.

Anytime, then, when one comes to question the meaning of Being, one eventually finds oneself confronted with an existing metaphysical stance, a set of assumptions, of basic concepts, of categories, of decisions regarding the ultimate nature of reality, that is, an understanding of the Being of beings, of all the entities that are, ourselves included; and a language infused, through and through, with the meanings of that metaphysics.

In modernity, the meaning of Being comes to be experienced, and thus understood in the concepts of reality, of nature, understood as the physical universe in its objective content, to be studied in the field of physics, of astronomy, of biology, etc., and in such an understanding of Being, beings are approached and encountered. The question of Being is asked in modernity, in terms of reality, which means the whole of the physical objects and the forces composing the universe, a meaning that is obvious to us; but not to an ancient Greek, for whom the matter was regarding Being, *phusis*, the ancient Greek word for

Being, which Heidegger interprets as appearing, as all that which stands in presence. Heidegger's interpretation that the meaning of *phusis* had for the archaic Greeks is inclusive of that which we call natural and that which we call social, historical. The word *phusis* is translated by the Romans as *natura*, that which is born, which is a new interpretation of Being and which eventually becomes what we come to call nature, in the modern meaning of the word, which we then contrast with the social, the artificial, the historical.

To summarize, Heidegger contends that since the understanding of Being is articulated in the categories of language and these categories and their meanings change over time, then the understanding of Being of an age is an interpretation of the Being of beings, that happens in the context of the successions of different set of categories which articulate the various interpretations of Being, for Heidegger history in the proper sense.

History is the successions of the interpretations of Being, experienced by the human in its understanding of the Being of beings, by which beings are experienced, made sense of, made manifest as what and how they are as beings. In this sense Heidegger considers the understanding, in the widest sense, interpretative, as articulated below.

The human being exists as an interpretation of the Being of beings, and thus an interpretation of its own being, that is articulated in the language of philosophy and yet, Heidegger considers this interpretation is pre-linguistic, it happens before the propositions of language, as will be articulated below; though it is in the propositions of language, in a set of basic categories, of basic concepts, that it can come to an articulation in self-transparency.

Heidegger's aim is not to propose a new and final set of categories, but to reopen and keep open the questioning regarding Being, in view of Being itself. In that Heidegger aims to reopen the question of Being to contemplation and discussion, one can simply delineate two ways in which he approaches this question throughout his career. In his first published book, *Being and Time*, he approaches the question of Being in view of the one being who asks this question, the human being. In his later works, he will focus on the history of the Western tradition of philosophy in view of the question of Being. He then aims to retrieve the basic concepts, the categories used in different epochs to give meaning to Being, and in so doing bringing them to a stand in the confrontation with Being itself.

In my reading of Heidegger's philosophy in view of the question of this thesis, that is, regarding what modern science is, I will now briefly delineate Heidegger's approach to the question of Being through his analytic of the human being, then I will provide a reading of Heidegger's interpretation of the history of metaphysics in order to clarify what modern science is.

1.8 The Hermeneutic of the Human Being as Preparatory for the Question of Being: the Human Being as Da-sein. as being-in-the-world

It is in *Being and Time* that Heidegger, in preparation to ask the question of Being again, approaches the question through the one being who can ask the question of Being, the one being who holds an understanding of the Being of beings, and in such understanding stakes who itself is.

At the beginning of *Being and Time*, Heidegger writes

Everything we talk about, everything we have in view, everything toward which we comport ourselves in any way, is being; what we are is being and so is how we are. Being lies in the fact that something is, and in its Being as it is; in Reality; in presence-at-hand; in subsistence; in validity; in Dasein; in the 'there is'. In which entities is the meaning of Being to be discerned? From which entities is the disclosure of Being to take its departure? Is the starting-point optional, or does some particular entity have priority when we come to work out the question of Being? Which entity shall we take for our example, and in what sense does it have priority?" (BT, 26)

(For Dasein as human being, see below) The answer to these questions is that the human being is the moment of departure.

Heidegger contends that all metaphysics has to define the human being's nature, but this ontological analysis does not reach the human being because it approaches the human being in view of a what that defines it. Heidegger instead contends that the human being is the one peculiar kind of being for whom an approach specific to it is to be employed. In other words, the human being is that kind of being, for whom its own Being is an issue, and thus reflectively the Being of beings, that is, it is the one entity in whom can arise the question of Being.

In other words, we know the Being of beings is, things exists without a human presence and human knowledge, yet in the questioning of Being, we know a human is there doing the asking, asking the question "why are there beings at all, instead of nothing?" And indeed even before this question is explicitly asked, in that there are beings and human beings knowingly relating to them, Heidegger contends, the human being must have a sense, even if vague and not clarified, of the Being of those beings. Before any explicit philosophical explication of the meaning of Being, the human being lives, dwells, is guided by an implicit sense of the meaning of Being in the happening of its ordinary life.

Heidegger observes that the human being is the entity, in whom a meaning of

Being explicates itself in its very existence. It belongs to the human being to live in a meaning of Being, and thus it belongs to the human to question regarding Being. No other being appears to do that.

In the introduction of *Being and Time* Heidegger considers why the question of Being is to be approached through an analytic of the human being. He writes that the peculiarity of the human being is that

in its very Being, that Being is an issue for it...and this means that further that there is some way in which Dasein understands itself in its Being, and that to some degree it does so explicitly. It is peculiar to this entity that with and through its Being, this Being is disclosed to it. *Understanding of Being is itself a definite characteristic of dasein's Being* (BT, 32).

So that the distinction that indicates that the human being is the being to interrogate in preparation for the question of Being is that the human being is “ontological” (BT, 32). The meaning of Being happens through the human being, in that the human being exists, the human being dwells in an already somewhat explicit understanding of its Being, and correspondingly an understanding of the Being of all beings.

In *Being and Time*, Heidegger articulates the analytic of the human being in the preliminary description of the human being as Da-sein. The literal translation of this ordinary German word is Da=there sein=being, that is “being-there”, in vernacular German use it indicates that something presently stands there, that it exists. While for Heidegger the being-there describes the human being as “the there of Being”. Heidegger specifically states that this can be easily misunderstood as position, while as Sheehan clarifies, Heidegger's meaning of da-sein and thus its translation in English, is that the da-sein means openness, the openness of being for me, that is, in that the human being is at all, he brings the meaning of being into the open in its own existence, not as choice, but as its basic state of being. The translation of Dasein, then, is openness, being-open, and the open-that-we-are (Sheehan 2001, 193-195)). It is constitutive of the human being to

be open to Being, in the sense not of being open to something outside, but in the sense to bring the meaning of Being in the open in its very existence, the human being is such openness of Being.

To clarify, Dasein does not mean consciousness, or mind, or self, a subjective state of the human being, a what by which one understands the outside world and oneself; but the attempt to describe how the human being is in its being. Heidegger writes that “when we designate this entity with the word 'Dasein', we are expressing not its 'what' (as if it were a table, house, or tree) but its being” (BT, 67). The peculiarity of the human being is that in its being, it exists in an interpretation of what it means to be, not necessarily intellectually articulated, but in its very existence. Heidegger referring to the human being as Dasein writes that “These beings, in their being, comport themselves toward their being” (BT, 67).

Heidegger writes regarding the human being that “Its ownmost being is such that it has an understanding of that being, and already maintains itself in each case in certain interpretedness of its being” (BT, 36). The human being as the open-that-we-are, is always found in a certain interpretation of its own being, of its existence.

For Heidegger the human being

always understands itself in terms of its existence-in terms of a possibility of itself: to be itself or not itself. Dasein has either chosen these possibilities itself, or got itself into them, or grown up in them already. Only the particular Dasein decides its existence, whether it does so by taking hold or by neglecting. The question of existence never gets straightened out except through existing itself (BT, 33).

In this sense, modern and Medieval Dasein are some of the historical possibilities,

historical interpretations of its being, the open-the-we-are, in which the human being

factually is in the happening of its life, in an ontological, historical possibility of itself.

That is to say, that the human being is ontological to its core, that is, in its very existence.

Heidegger clarifies that “‘Being-ontological’ is not yet tantamount to ‘developing an ontology’. So if we should reserve the term ‘ontology’ for that theoretical inquiry which is explicitly devoted to the meaning of entities, then what we have had in mind in speaking of dasein’s ‘Being-ontological’ is to be designated as something ‘pre-ontological’” (BT, 32).

Heidegger points out that this pre-ontological state of being of the human describes the fact that in that the human being is, that it exists, it implicitly understands its existence, which does not mean that it does so in an articulated theory of its being, in an ontology of itself articulated in fundamental categories, but that existence is always already understood in some way or another, even before a thought out ontology, and indeed this pre-ontological state provides for the possibility of any thought out ontology.

For Heidegger the human being cannot be designated by asking the question what is it? But by the question who is it? Which leads to the observation that the human being is that being that is always towards its “existence”, towards that which it “can comport itself in one way or another, and always does comport itself somehow” (BT, 33) In that a human being is, it is comporting within an already operative interpretation of its own Being, its own existence.

The basis condition in which the human being is found is not as an isolated self-consciousness, or a mind; the human is always already found relating to that which environs it, involved in the world, projected out of itself in the world, out of an implicit understanding of itself and the world.

Thus for Heidegger knowledge does not start in conceptual representing, or mental picturing, indeed modalities of knowing, the human knows in the most simple and

immediate relating to the world in which one constantly is. Heidegger aiming to describe the human being in its Being, describes the human not primarily as the representational thinking subject versus the objects. Heidegger writes that

When we ask about the mode of being of knowing itself, then it must kept in mind from the outset that every act of knowing always already takes place on the basis of the mode of being of Dasein which we call in-being, that is, being-always-already-involved-with-a-world. Knowing is now not a compartment that would be added to an entity which does not yet 'have' a world, which is free from any relation to its world. Rather, knowing is always a mode of being of Dasein on the basis of its already being involved with the world (HCT, 161).

For Heidegger the human being is not primarily a subject versus the object, but a being, that in his Being is always already projected out of itself knowingly relating to and dwelling with the things of the world. The being of the human being is found rather than being a subject with its cognitive faculties versus the objects, in its being-in-the-world.

Heidegger writes that “For the Dasein, with its existence, there is a being and an interconnection with a being already somehow unveiled, without its being expressly made into an object. To exist then means, among other things, *to be as comporting with beings*...It belongs to the nature of the Dasein to exist in such a way that it is always already with other beings” (BP, 157). And this being with other beings essentially involves a knowing, of oneself by comporting with beings.

Heidegger contends that all modern metaphysics approaches the human being with a box model, here the encapsulated subject, there the external objects. But when observed in view of its Being, the human being is found, Heidegger contends, not boxed in at all. The human being is always found out of itself, projected out of itself in a somewhat explicit possibility of itself, dispersed in concerned involvements, always already relating to other beings, in view of projects of all kind and scope.

Heidegger contends that the human being is always found immersed in the world, knowing its way around the world. World here is not just the whole of the objects comprising world, theoretically disclosed, nor is all the practical knowledge of ordinary activities that precedes theoretical knowledge, nor the spaciality of the world in which one moves and acts, in which one exists. These are possible in that the human being in its being is being-in-the-world. In *Being and Time* under the heading “Being-in-the-world in General as The Basic State of Being of Dasein” (BT, 78), Heidegger in articulating the meaning of being-in-the-world in view of the being-in writes that “In' is derived from 'innan'--“to reside', 'habitare', 'to dwell'...'An' signifies 'I am accustomed', 'I am familiar with', 'I look after something’” (BT, 80).

Thus in the description of the human being as being-in-the-world, the being-in means to reside with that which is familiar in our daily looking after it. The human being is always found not as a being who has to articulate in the language of theoretical knowledge before acting in any way, the human being is always already acting in its concerns, in the direct involvements of its life situation, in its looking after things.

Beings, things are first encountered not in a theoretical, or philosophical, or representational knowledge expressed in language regarding their natures, beings are encountered in an understanding of them, from our existential situation, in view of all our compartments, our concerns, our involvements, in care.

Each being is not known in the theoretical knowledge of its nature, it is known first as something that is identified as this or that, that is, “something as something”. Heidegger describes that each thing is encountered in the knowing, which works in advance, in which each encountering being is met in an hermeneutical *as*, that thing *as*

door, this thing *as* chair, and each thing thus understood, that is interpreted *as something*, as door, as chair, as car, as tree, is then engaged in view of some use in the context of our daily concerns, doings, occupations and involvements with other beings. So that all beings, as the specific beings that they are, are encountered “in order to”, in order to do this or that with them. For instance the knowing of that thing as knife in order to cut the bread; that thing as spoon in order to scoop and stir the soup, and so on.

Things are encountered always in the fore knowledge of each thing as what it is, and what it is for in view of human concern and use. That is, knife, spoon, fork, chicken, roof, countertop, etc., are known as what they are, specifically as what they are for, in the already available context of an interrelated whole of meanings that interprets each thing in view of its use within the scope of human concerns, of human existence; and this is not a theoretical or representational thinking. For instance, the act of entering in the lecture hall through the door does not imply a reflective thinking about the door, yet the door “as” door, as entry and exit, must obviously be known in advance without this be made explicit at the moment of entering, so that one simply “opens the door and enters the room”, without any theorizing or spoken words.

In other words, Heidegger contends, the hermeneutic “as” is prior to theoretical propositional knowledge. In that the human exists, the human exists as being-in-the-world, in an interpretation of the Being of beings that is pre-conceptual, pre-theoretical, by which beings are encountered, made intelligibly manifest to us, in our constant relating and using them.

Heidegger contends the human being is being-in-the-world, not just as a property belonging to it, or in the sense as residing among the physical objects and having an

understanding of them. Heidegger contends the human can find and use beings, discover or cover up things, because it is already being-in-the-world, knowingly relating toward something as this or that, for some use: a world that is intelligibly disclosed before any propositional knowledge.

Heidegger points out that we ordinarily find beings in the general sense of the functional whole of what he calls, equipment, the functional whole of all that which we use as tools, that which is immediately handy at our disposal in the context of our concerns, already there in their availability for some use. The human being, in that it is, it is already-relating-to-something-in-the-world in the ordinary contexts of meaningful references, the familiarity in which we are and move, as Heidegger writes “the *always-already-there* of a familiar continuity of references” (HCT, 189).

In this regard, Heidegger writes that

Every entity that we uncover as equipment has with it a specific *functionality*...[an in-order-to, a way of being functionally deployed]...This functionality which each entity carries with it within the whole functionality complex is not a property adhering to the thing, and it is also not a relation which the thing has only on account of the extant presence of another entity. Rather, the functionality that goes with chair, table, window is exactly that which makes the thing what it is. The *functionality contexture* is not a relational whole in the sense of a product that emerges only from the conjoint occurrence of a number of things. The functionality whole, narrower or broader-room, house, neighborhood, town, city-is the prius, within which specific beings, as beings of that character, are as they are and exhibit themselves correspondingly. If we are actually thinking the wall, what is actually already given beforehand, even if not understood thematically, is living room, drawing room, house. A specific functionality whole is *pre-understood*...Existing in an environment, we dwell in such an intelligible functionality whole. We make our way throughout it. As we exist factually we are always already in a *envirning world* (BPOP, 164).

To clarify the meaning of world in being-in-the-world belonging to Dasein,

Heidegger writes that

We can say that the snail at times crawls out of its shell and at the same time keeps it on hand; it stretches itself out to something, to food, to some things which it finds on the

ground. Does the snail thereby first enter into a relationship of being with the world? Not at all! Its act of crawling out is but a local modification of its already-being-in-the-world. Even when it is in its shell, its being is a being-outside, rightly understood. It is not in its shell like water in the glass, for it has the inside of its shell as a world which it pushes against and touches, in which it warms itself, and the like. None of this applies to the relationship of being of the water in the glass, or, if it did we would have to say even of water that it has the mode of being of Dasein, it is such that it has world. The snail is not at the outset only in its shell and not yet in the world, a world described as standing over against it, an opposition which it broaches by first crawling out. It crawls out only insofar as its being is already to be in a world. It does not first add a world to itself by touching. Rather, it touches because its being means nothing other than to be in a world. / This applies similarly to a subject to which knowing is ascribed (HCT, 166).

In other words, for Heidegger the human being is not the isolated subject that represents that which is other, outside of it, but before that the human being is a being already outside of itself in the practical, available, meaningful interactions with the things of its world, personal and commonly shared with others.

Heidegger contends that the human being does not primarily and constantly move from theoretical knowledge about the world, the knowledge the human being as subject has of the objects, as from one enclosed box reaching out to the things, the human being is found first, already involved with the world, copying with it, dealing with it, using it, out of a “fore grasping” of its existential situation. And this fore grasping is hermeneutical, that is, interpretative, that is to say that, as Grondin puts it, “all the 'things' and events are pre-interpreted by this anticipatory understanding 'as' things destined for this or that use” (Grondin 1994, 94).

So that in all our comportments toward anything, a hermeneutic “as” of every thing is already operative, each part of the referential whole of all the things that are of use, which Heidegger describes as equipment. Yet this pre-ontological existential situation is possible on the general state of being that Heidegger describes as being-in-the-world. So that the possibility of a thought out ontology or any theory is founded upon the fact that the human being is, constantly dwells in an implicit interpretation of itself and the world. Ontology, all theories, and thus propositional knowledge is possible upon this general, pre-linguistic state of Being of Dasein. In this regard Grodin writes that for

Heidegger “More fundamental than the apophantic 'as' (that is, the explicitness of phenomena that have been explicated in propositions), an hermeneutic 'as' is at work: a primally interpretative fore-understanding of the world operates on the level of Dasein” (Grondin 1994, 94).

For Heidegger understanding is interpretative in that we understand something *as* this or that thing, in the order to of functionality, without and before any theoretical knowledge is articulated in propositions. In this regard, Grondin writes that “This as-structure, therefore, is not necessarily dependent on predication. In having to do with something I make no thematically predicative statement. The as structure then is essentially pre-linguistic; it belongs simply to our 'behavior', Heidegger writes” (Grondin 1994, 94).

Upon this as-structure, for instance, one encounters and engages a ball, implicitly known as a ball, that is, one makes sense of that thing as ball, that is, one takes that thing as ball, in simply using it for play. Upon such hermeneutic “as” then one can speak in propositions to specify that the ball is a toy, that is made of plastic, etc.. Thus one can say of the ball that it is not a natural thing but an artifact; that is, one can voice statements regarding what its nature is and regarding its properties, yet before these, the ball as toy has already been made sense, made intelligible, precisely by our doings, by our comporting with it.

The human being in all its concerns and comportments makes sense of things in the hermeneutic as, that is a “taking something in terms (in relation to) a human concern” (Sheehan 2001, 192), for instance taking a rock as a hammer, or as rock to be moved, or as a rock for building, or a rock for the sculpture, or as a rock to be tested for its strength.

The human being as human being is being-in-the-world, a being already comports towards beings, making sense of them within the scope of its concerns. The human being is being-in-the-world, a being always already involved with beings in the world, knowingly, in the hermeneutic “as” of functionality. That is to say that, our understanding of world is pre-conceptual, pre-ontological, it is already there before any philosophical reflection or explicit theoretical knowledge. The human being is in a world, in meaningful relations to beings which constitute its personal existence, its world, before a theoretically explicated ontology (BPOP, 33). The human being exists as a pre-ontological understanding of the world.

The world is implied in all our concerns and involvements with the things of the world, that is in our daily involvements with equipment, with the things one uses “in order to...”, that is, in view of human concerns and purposes. Heidegger articulates that the making sense of things in a contextual whole of meanings in view of our concerns is world. World then is always already operative in advance of any encounter of specific beings, which always reference to each other, balls, rooms, floors, walls, buildings, streets, parks, etc., these are intelligibly there, out of an overall sense of world, in an interpretation of each thing as this or that in view of our concerns, in a whole of meaningful relations with other beings and ourselves. This whole is world.

The human being is in view of all its relations to other beings and itself, it is not primarily an isolated subject that comes out and reaches out to the beings of the world, the human being is being-in-the-world, which as Sheehan puts it, actually means “being-the-world” (Sheehan 2001, 194).

For Heidegger, without the human being there is no world, the human being is

Dasein an “always-being-open” (Sheehan 2001, 194), that is, being involved with things in an already interpreted existential situation. This state is so close to us it is usually unnoticeable. Heidegger writes that “The world as already unveiled in advance in such a way that we do not in fact specifically occupy ourselves with it, or apprehend it, but instead it is as self-evident, so much a matter of course, that we are completely oblivious to it” (BPOP, 165). The sense of world is so close to us, it is usually simply overlooked in our engrossed involvements with the beings of the world.

For Heidegger being-in-the-world is apt to describe the encompassing unitary happening of one's existence. As far as the human being is at all, the human being comports itself toward existence, with a more or less explicit understanding of existence, that is, of its own Being, and of the Being of beings which are with the human being in a world; that is, in a contextual whole of significance in which things show up as to what they are for in view of human concerns.

In this sense, Heidegger writes that the human being *finds itself* primarily and constantly in *things* because, tending them, distressed by them, it always in some way or other rests in things. Each one of us is what he pursues and cares for. In everyday terms, we understand ourselves and our existence by way of the activities we pursue and the things we care for. We understand ourselves by starting from them because the Dasein finds itself primarily in things (BPOP, 159).

Heidegger writes that “to Dasein, Being in a world is something that belongs essentially. Thus Dasein's understanding of Being pertains with equal primordially both to an understanding of something like a “world’, and to an understanding of Being of those entities which become accessible within the world” (BT, 33). The human being brings meanings into the open in its existence, in its Being, right in view of all other beings, and that is, in view of their Being, in an understanding of the Being of beings,

that is, in an interpretation of their Being, that is, the making sense of beings' presence.

Heidegger contemplating the human in its happening finds being-in-the-world, a being that defines itself in its concerns, in its involvements with beings in the world, out of its existential situation, that is, an interpretation of the meaning of Being. That is in the interpretations of each thing of use “in the order to” of human concerns, even if not clearly articulated at all in language, it is weaved, as constitutive, an already operative interpretation of the Being of those entities, that is, an understanding of the Being of those entities implicitly happens, as Dreyfus puts it “things show up in the light of our understanding of being” (Dreyfus 1990, 163) It is this always already happening interpretation of the Being of beings, that can be thematized in philosophy, so that it can be theoretically articulated in concepts, in the language of metaphysics.

Heidegger considers that if modern metaphysics defines the human being as the subject representing the objects, an explication prior to this one and more consonant to the being of the human being as it shows itself, finds the human being as being-in-the-world. He writes that “The Dasein is not also extant among things with the difference merely that it apprehends them. Instead, the Dasein exists in the manner of *being-in-the-world*, and this *basic determination of its existence* is the *presupposition for being able to apprehend anything at all*. By hyphenating the term we mean to indicate that this structure is a unitary one” (BPOP, 164). That the objects can come to stand against a subject is possible on the basis of the constitution of the being of the human being as being-in-the-world, as Heidegger puts it “Being-in-the-world itself belongs to the determination of our own being” (BPOP, 166).

World is the already disclosed interrelated whole of meaning in which and by

which the human being dwells among other beings, in the ordinary and practical activities of daily life, that is, in the referential whole of significance in which each thing shows up as this or that, for this and that use, in a somewhat explicit understanding of the nature of things, that is, of the Being of beings.

For Heidegger, world does not equate but encompasses the enumeration of all the beings accounted for in the world. The sense of the world is what guides the accounting and enumeration of the beings of the world. The world is the pre-conceptual grasping of our existential situation in an unquestioned obviousness, it is obviously there, it is implicitly there in all our daily concerns and involvements with any being of the world.

This is what Heidegger writes, in *The Basic Problems of Phenomenology*, regarding world, he writes

And the world? Is it the sum of what is within the world? By no means. Our calling nature, as well as the things that surround us most closely, the intrawordly and our understanding them in that way already presuppose that we understand world. World is not something subsequent that we calculate as a result from the sum of all beings. The world comes not afterward but beforehand, in the strict sense of the word. Beforehand: that which is unveiled and understood already in advance in every existent Dasein before any apprehending of this or that being. The world as already unveiled in advance is such that we do not in fact specifically occupy ourselves with it, or apprehend it, but instead it is so self-evident, so much a matter of course, that we are completely oblivious to it. World is that which is already previously unveiled and from which we return to the beings, with which we have to do and among which we dwell. We are able to come up against intrawordly beings solely because, as existing beings, we are always already in a world. We always already understand world in holding ourselves in a contexture of functionality. We understand such matters as the in-order-to, the contexture of the in-order-to or being-for, which we call the contexture of *significance* (TBPoP, 165-166).

Heidegger observes the human being is being-in-the-world, that is, in a pre-conceptual understanding of the world, in an existential situation that allows any meaningful interaction to occur, that is, in a referential whole of significance to which each being that is belongs to. The human being is always within an already operative

interpretation of each thing as to what it is and what it is for, in a such a referential whole of significance. And for Heidegger this is already there before any language and yet can and is brought to articulation in language. In other words Heidegger contends language is derivative from this more original state of Being, it is rooted in what Heidegger calls the being-in-the-world of Dasein (Grondin 1994, 101). The understanding of Being is pre-linguistic, it operates before having to be articulated in language.

It is upon this pre-conceptual existential situation, that is, comporting within an already operative interpretation of its own existence and of the Being of beings, within an overall sense of world, than any ontological or theoretical reflection can proceed. This can be done deliberately when one interrupts any use of things and instead regards their nature, their Being, the simple fact that they are. For instance, Heidegger points out that when something breaks down, as in hammering, the hammer breaks down, then what the hammer is comes to the fore when one thinks about how to replace the hammer, or if that is not possible, how to produce a new one; so one begins to contemplate the material of the hammer, its form, its weight etc..

Thus Heidegger denotes all things are encountered either as ready-to-hand, their implicit availability in functionality, that is ready for a human use for the sake of this or that human doing; or as present-at-hand, that is, when the available use of things is interrupted and their sheer presence is contemplated by questioning regarding what things are, regarding their basic properties, regarding their natures, their Being.

In asking regarding the Being of beings, in the attempt to account for the fact that beings are, one already finds an operative understanding of Being that is implicit in the way one behaves in any way toward anything, that is, in any comporting, an

understanding of the nature of things is already present in the way in which human beings comport themselves. But in that the human firstly and primarily uses things, the ontological questioning regarding their nature comes second, yet when this questioning happens the answer is found already operative, in the most general sense of reality by which one deals with things, the ontological answer is already operative in the factual ways in which we deal with everything.

The referential whole of functionality, in which things show up as equipment within the scope of human concerns, in the widest sense, precedes ontological questioning, and includes a somewhat explicit interpretation of existence, of what it means to be. Then ontological questioning already finds a more or less defined answer that accounts for the nature of things, that is, for the Being of beings. The understanding of the Being of beings is pre-conceptual, it does not have to be thought out in ontology, it is present in every comporting.

In other words, the hermeneutic “as” by which all things of use are understood and thus encountered is prior to the onto-theological reflection of philosophy, which itself is grounded in the pre-conceptual understanding of Being which opens and guides any ordinary experience whatsoever, in which beings are encountered, in their intelligible and meaningful manifestation. In all our doings and comportments toward anything, an hermeneutic “as” of every thing as to what it is, and what it is for, is already operative in the referential whole of all the things that are of use, what Heidegger describes as equipment. And implicit in such an interpretation of each thing of use, even if not clearly articulated in language at all, yet there already operates an interpretation of the Being of those entities. This is made thematic in philosophy and is there attempted to be delineated

in basic concepts, in fundamental categories articulated in the propositions of language.

Heidegger retrieves that before any thought out, that is, theoretical understanding of Being, a pre-conceptual understanding of the Being of beings is always already operative, and this understanding is interpretative. The understanding of the Being of beings is an interpretation of the Being of beings, which supports one's very sense of reality, and is already present for and in each and every one person comporting and acting in any way. It is the task of philosophy to make such pre-conceptual understanding of Being clear, transparent to itself, theoretically. Yet the understanding of Being if it is the closer to us is, in view of the law of proximity, it is most elusive to come to terms with, yet, at the same time, it is operative in and as all comporting and behaving, it is behind all saying, it is behind all language.

That is to say that, prior to any philosophical reflection regarding the Being of beings, the human being dwells in the pre-conceptual understanding of itself and the world, an understanding that is interpretative of all the beings in the world in their mere use for this or that end, and inclusive of this interpretation lies also the interpretation of the beings of the world in terms of their nature, that is to say, their Being, inclusive in an obvious sense of what it means to be in general, even though not explicitly articulated in concepts.

In this pre-conceptual interpretedness, the human always already dwells, and that means it comports itself interpretatively toward itself and the world, the human being finds itself in all the meaningful relations that constitute all its involvements in the world, that is, the whole of its existential, daily situation is, for Heidegger, at bottom, interpretative, even when not one word is uttered.

As in the instance above, the act of entering in a room through a door does not imply any mental representing or theoretical thinking about the door, yet the door “as” door must obviously be known in advance without this be made explicit at the moment of entering, so that one simply “opens the door and enters the room”, without any theorizing or speaking. And the door belongs to the whole of interrelated meanings of the beings of the world as doors, lamps, classrooms, buildings, parking lots, streets, night courses, markets, wall street, the white house...

The understanding, as Heidegger takes it, does not just pertain with the meanings of the labels with which naked entities are categorized and explained, but to the very way beings presence or manifest in any human comporting or doing. And this understanding is always already happening, that is, it is always already operating “within a set of already interpreted relationships” (Palmer 1980, 131), that is, within a relational whole of meanings, the intelligible nexus of meanings in which the beings of the world show up as the beings that they *are*.

In other words, beings and how their Being, that is, how their nature is understood, lights up the appearance and presence of their obvious intelligibility and availability to a human being in relation to a structural whole of interrelated meanings in which human beings live their lives, in the fabric of all its relations with the beings belonging to world.

In this sense, an answer to the question of Being is always present in every comporting, in all that we do, even though not necessarily made expressly thematic and thus articulated in its structure in concepts. The understanding of the Being of beings is that which must be there, preeminently in advance, even if not made explicit and

articulated clearly; for anything is part of a whole nexus of meanings, the whole fabric of meaningful relationships in which all human activities take place, in any ordinary routine. In the way one conducts oneself in any way toward anything, or toward itself, one already dwells in an understanding of Being, which is an interpretation of Being and thus of all the beings that comprise the whole of Being, the whole that each one of us calls world, in which we ourselves are as the beings that we understand ourselves to be.

All beings are experienced in the intelligibility of their belonging to the fabric of relationships in which they are of use in the obvious and ordinary ways in which they do for the human being. All such uses, already bear the interpretation of the Being of beings that belongs to a certain time and place. In other words, the human being as being-in-the-world, is essentially an ontological being, a being that *is* in the very possibilities opened up by the historical understanding of Being.

By suspending the ordinary ways in which beings are manifest in ordinary use, Heidegger contends, one can then thematize, that is, reflect upon the understanding of the Being of beings in theoretical thinking, being it ontological or scientific, that is, not in view of our direct use of beings, but as to what beings are, regarding their nature, their Being. Their Being becomes thematic upon an already happening interpretation of the existential situation of Dasein.

Heidegger's translator Albert Hofstadter, in the introduction to *The Basic*

Problems of Phenomenology writes

When Dasein comports itself toward any being it always does so, and must by its very constitution do so, through an understanding of the being of that being. When the farmer reaps his corn, he deals with the corn as the vegetable being that it is; he understands it as plant, with the being that belongs to plant, and to this particular kind of plant. Human behavior is mediated by the understanding-of-being. If ontological means 'of or belonging to the understanding of being' then the human Dasein is by its very constitution

an ontological being. This does not mean that the human being has an explicit concept of being, which he then applies to each encounter with beings; it means rather that before all ontology as explicit discipline of thinking, the human Dasein always encounters beings in terms of a pre-ontological, pre-conceptual, non-conceptual grasp of their being (BPOP, xxiii).

Ontology is thus the bringing to explication this pre-conceptual but already operative understanding of Being. Ontology is "the conceptual comprehension, of what earlier was grasped only in the immediateness of the living encounter" (BPOP, xxiii).

Heidegger contends that an understanding of what it means to be is always operative regardless of the individual self-transparency to it, that is, it might not even been explicitly articulated by the very people who are and live by such an understanding of Being. Yet when one engages such questioning, one already finds itself assimilated in the culture of one's growing up, using a language which inhabits the structures of its historical understanding of Being.

One comes to learn of beings as one grows up in the immediacy of one's living encounter with beings; metaphysics, ontology is the attempt to make clear, to lighten up in clarity the understanding of Being that we *are* already, ahead of ontology, to articulate the meaning of Being in which one has grown and in which one then already dwells, in that one can say "I am", and know its own nature implicitly in such saying, or respond to an insect infestation in the obviousness of this response.

Coming after the immediacy of the constant encountering of beings, intelligible as to what they are for in our daily use for some end, the questioning that asks about the Being of beings, regarding the fact that they are at all beyond any human use or concern, comes secondarily in time but it is first in rank, in aiming to articulate the guiding interpretation of the Being of beings which "grounds an age", guiding, that is, as Heidegger points out, the daily routines of one's life as much as the search for the truth,

for knowledge in the proper sense.

In metaphysics, in ontology, in first philosophy happens the articulation of the concepts that delineate the understanding of Being that grounds an age. For Heidegger philosophy is that thinking that goes back to the roots, toward the most radical, and that this going back toward the origins or ground ultimately finds the question regarding Being, which is also the closest of all questions, in that the human being is the being that clears the question of Being, in the clearing of existence. The understanding of the Being of beings, Heidegger metaphorically calls the clearing, as a clearing in the forest, that is, an open, illuminated, intelligible space in which one encounters beings in their intelligible presence.

For Heidegger the human being does not merely carry an understanding of Being as a property, no matter how fundamental. The human being *is* an understanding of Being, for, in, and according to which it lives and dies, that is, it lies at the core of its being to be the meaning of Being in its living, as the clearing of Being. And the clearing is pre-ontological, it is always already happening. In that the human being exists, it exists as an understanding of its own Being and the Being of beings, a somewhat explicit, overall sense of reality, which philosophy reflects upon in the attempt to articulate clearly and exhaustively.

The reflective questioning of philosophy strives to elucidate the interpretation that sustains all relations with beings and oneself, which compose ordinary daily life of a given society in a certain time. Since one is always part of a culture, a community that lives already within an interpretation of the Being of beings, then when one raises the question of Being, one then already finds oneself within an already ready set approach to

all beings. Each individual person, either finds himself part of a Midwestern family, an amazon tribe, or a Balinese community, within an interpretation of Being already factually operative, Heidegger writes that “Factual life always moves within a determinate *interpretedness* that has been handed down, or revised, or reworked anew” (Heidegger in Figal 2009, 45).

In interpreting Being, the Being of beings comes to be disclosed in the intelligibility in which beings come to be the beings that they are for us. Such historical interpretations of their Being are how, in different epochs, humans have interpreted the Being of beings, and so the Being of the universe, the Being of the animals, the Being of the earth, the Being of the plants, the Being of the planets, the Being of the human and so forth, then any comportment toward beings happens within this interpretation. So that food shopping or buffalo hunting, the ceremonial ritual or the scientific experimental research can then be experienced, that is, engaged by the participants in meaningful experiences, from a comprehensive and cohesive meaning of Being.

In defining the meaning of Being, an approach to the Being of all beings is delimited wherein all entities and events are interpreted as to their Being; within this delineation to this most comprehensive questioning, the parameters of what is real and thus truthful are absolutely determinative of the ways, standard procedures, and methodologies used to pursue the truth regarding beings, as in the ceremony of the ritual or the experimental research of modern natural science.

The existence of the human being is such that it always resides in an understanding of Being as the horizon, as the whole of all the beings that are reciprocally related, that is, referencing to each other in a comprehensive meaningful structure, which

can be made explicit theoretically, but which, before that, guides, opens the way for one to conduct oneself in daily affairs. It is this historical interpretation of the Being of beings and of the Being that is human, that provides for the possibility of ancient Greek Dasein, of Medieval Dasein, or of contemporary Dasein; that is, for the way Being is experienced in time by the “open-that-we-are”. The Greek temple, the Medieval cathedral, and the modern bank are expressions of three possible Dasein, three historical interpretations of Being.

Heidegger contends, this understanding of Being is an historical interpretation of the Being of beings, that provides stability for all transactions with beings and with oneself. When, thinking questioningly regarding the Being of beings, one always finds an operative understanding of the Being of beings, a pervasive sense of reality, of Being, which is so basic, implicit in all one does, it is taken for granted, it is obvious until it it comes to be questioned.

Yet the time comes when it arises in the human being the impetus to question regarding such a guiding understanding of Being. In this sense, Descartes thus starts the first meditation in the *Meditations on First Philosophy*, when modern metaphysics takes its first decisive steps. He writes

Some time ago I was struck by the large number of falsehoods that I had accepted as true in my childhood, and by the highly doubtful nature of the whole edifice that I had subsequently based on them. I realized that it was necessary, once in the course of my life, to demolish everything completely and start again right from the foundations if I wanted to establish anything at all in the sciences that was stable and likely to last” (Descartes 1647, 12).

Yet, to clarify, metaphysics is not the proclamations of the sense of reality by some philosophers to which all others abide by; philosophers whose meditations focus on the questioning regarding the Being of beings, attempt to bring to explicit articulation the

fundamental understanding of reality, of Being, which comes to guide the life of a people in a certain time. Heidegger even contends some philosophers delineate in advance of the times, the new understanding of Being that comes to guide a people, a civilization (Thomson 2005, 26).

In *An Introduction to Metaphysics*, Heidegger gives this definition of philosophy “What philosophy essentially can and must be is this: a thinking that breaks the paths and opens the perspectives of the knowledge that sets the norms and hierarchies, of the knowledge in which and by which a people fulfills itself historically and culturally, the knowledge that kindles and necessitates all inquiries and thereby threatens all values” (IM, 10). For instance, Heidegger indicates that Nietzsche suddenly uses the word values for the word that had been used to refer to the basic concepts of philosophy since Aristotle, the categories. And since Nietzsche, value-as a new way to account for the Being of beings becomes a central and current term for modern philosophy and culture.

To summarize, a metaphysical stance, a meaning of Being, is always present for all our thoughts, actions, feelings and moods “to be”, for all our doings, our comporting, our speaking. Heidegger denotes the being of the human, before the modern dichotomy of subject versus the object-related by mental representing, but in a closer description of the phenomenon itself, as being-in-the-world, pointing to the always already happening interpretation of Being which directs, as from the background of obvious knowingness, the meaningful encounter and engagement with all the entities that are in the circle of one's existence, the intelligible whole of beings in the world and of world, personal and shared.

As in circle, as in the clearing of the forest, we are within the nexus of meanings

from the most complex to the most simple, that interprets and brings to intelligibility, and availability all that which is, all beings, ourselves included, We are as such a basic interpretation of the nature of reality, that is, of the Being of beings, by which we orient ourselves in the world and to which the world responds, in any encounter of each being present in the world.

It is upon this pre-conceptual existential situation, existential in the sense of the already happening self-interpretation of the one that exists-Dasein, that the thematic questioning of the Being of beings can be carried in philosophy, in ontological thinking, in the articulation of the categories that systematize in clarity the understanding of the Being of beings, that is, the interpretation of the Being of beings that guides and sustains one's living in the meaningful fabric of relationships with all that is.

Thus, Heidegger contends, the understanding of Being implicit in being-in-the-world is pre-conceptual and interpretative, and historical. This existential interpretation is historical, it changes over time, it is a changing interpretation of the meaning of Being that constantly happens as far as human beings exist, that is, *are*.

Heidegger's study of the whole tradition of Western philosophy retrieves that if the metaphysical approach to find and articulate fundamental categories, such as matter, form, time, space, motion, substance, causation, etc., in view of the question of Being, onto-theologically understood, has remained constant, the categories themselves have changed over time. Thus one can say that various “constellation of intelligibility” (Thomson 2005, 8), various frameworks for interpreting the Being of beings have succeeded over time, thus various interpretations of the meaning of Being have sustained the various ages of history. History is the succession of metaphysical stances, the various

interpretation of the meaning of Being, that “ground and illuminate an age”, in the general, diffuse sense of reality of an age.

Thomson, in this regard, says in an interview, “For Heidegger, metaphysics is not the abstruse concern of philosophers isolated in their ivory towers; metaphysics structures our very sense of reality. Metaphysics is ‘the history that we are,’ as Heidegger puts it” (Thomson 2006). The articulation of the understanding of Being that happens in philosophy aims to articulate, clarify, and explicate the basic understanding of reality that underlies all that we do, the operative understanding of the meaning of Being that we are, the open that we are, in that the human being *is* an understanding of Being, in living, in experience, in the factuality of existence. And this understanding of Being, understood as the fundamental interpretation of the meaning of Being, changes over time. Thus Heidegger understands history proper.

Thomson relates that simply put everything is so and so, such and such according to the fundamental sense of what is, i.e. of what reality is, of how it stands with Being. If we change our sense of what reality is, of what is, of Being, everything changes. In this regard, he writes that “Metaphysics determines the most basic presuppositions of what *anything* is, including ourselves” (Thompson 2005, 8).

For Heidegger, a metaphysical stance is always present in all our concerns, in our doings, in our preoccupations, actions, and moods, in our being in the world. As in a circle, we live, act, are within the nexus of definitions and meanings of all beings, ourselves included, in which all beings show up from out of the basic and comprehensive understanding of Being, the “nature of reality”, the Being of beings. It is this fundamental orientation that sustains all intelligible interactions with any entity at all, ourselves

included.

In view of what Heidegger says, that “Metaphysics grounds an age” (QCT 115), Thomson writes that “Heidegger’s claim is that by giving shape to our historical understanding of 'what *is*,' metaphysics determines the most basic presuppositions of what *anything* is, including ourselves. 'Western humanity, in all its comportment toward entities, and even toward itself, is in every respect sustained and guided by metaphysics' (N IV 205/N II 343)” (Thomson 2005, 8).

To clarify Thomson writes, in a note,

as Dreyfus succinctly explains: "The practices containing an understanding of what it is to be a human being, those containing an interpretation of what it is to be a thing, and those defining society fit together. Societal practices thus transmit not only an implicit understanding of what it is to be a human being, an animal, an object, but, finally what is for anything to be at all' (Heidegger on the Connection between Nihilism, Art, Technology, and Politics,' 295) (Thomson 2005, 8).

To reiterate, metaphysical thinking proper is not the strange, convoluted ruminations of philosophers but it is the attempt to clarify the understanding of Being in which we all live, that we are. Again understanding is not only intellectual ontological explication, it is the interpretedness in which we already are and comport ourselves towards this and that being. Heidegger writes that

In whatever way we conceive of knowing, it is...a *comportment toward beings*...But all practical-technical commerce with beings is also a *comportment toward beings*....In all comportment toward beings—whether it is specifically cognitive, which is most frequently called theoretical, or whether it is practical-technical—an understanding of being is already involved. For a being can be encountered by us *as* a being only in light of the understanding of being (BP, 275) (Heidegger in Dreyfus 1990, 53-54).

Again, Heidegger describes the human as always comporting toward something with which it is already familiar, the human being is always projected in this familiarity with the beings of the world, projected in the familiarity of its existential situation, the

signification of all its relationships with the beings in the world, that is, always projected withing possibilities of Being, which are implicitly available to its existential situation, at a personal level and the general level of society.

The all-inclusive questioning of metaphysics, of ontology, reflects upon and tries to bring to clear articulation, this already happening understanding of the meaning of Being, as we say today, the ultimate nature of reality, or, the most basic assumptions regarding the nature of reality, i.e. regarding the point of departure, that fundamental approach in which historical Dasein, the openness that we are, comports itself toward this or that entity and in so doing defines the Being of this or that being, so that all beings and its own being are made intelligible by such an understanding of Being that pervades all experiences.

To recapitulate, for Heidegger. philosophy is thinking, it is the questioning that regards the Being of beings, “the question embraces all that is...not only what is now present at hand in the broadest sense, but also what has previously been and what will be in the future (IM, 2). The question is not ultimately delimited by a being, or beings, but is delimited only by the nothing itself “only by what simply is not and never is” (IM, 2). The question regarding Being is the broadest question, the deepest and the most originary (IM, 2).

The question regarding Being is for Heidegger properly conceived and articulated as the question of Being as Being, which for Heidegger is the question “most worthy of thinking”. This questioning Heidegger contends, happens at the time of the archaic Greeks philosophers-poets, as the very inception of what later becomes formalized in the discipline of philosophy, in the pre-Socratic and classical Greek philosophy when, for

Heidegger, the onto-theological configuration of the question of Being takes such a configuration explicitly and decisively for all subsequent Western philosophy in the works of Plato and Aristotle, becoming the backbone of the metaphysical tradition of the Occident.

In such a configuration of the questioning, philosophy approaches the question of Being, by making Being into a being, the question takes an onto-theological structure, as the question regarding the Being of beings and Being as a whole, explicated in language, in the basic concepts of philosophy.

1.9 The Foundation of Science in Philosophy, and the Ground of Philosophy in the Pre-ontological Understanding of Being The Enigma of Being.

In Western culture, Being is the most comprehensive, symbolic reference to “all that which is”, reality in the most general sense. That we can say “reality is...”; “nature is...”; “science is...”; “physics is...”; “history is...”; “art is...”; “religion is...”; an understanding of the “is”, of Being, is already operative in all these propositions regardless of how they are specified and predicated. And also these words, reality, nature, science, physics, history, art, etc., themselves already stand in an historical interpretation of their meaning, their Being, which is then related to an understanding of Being in general.

Philosophy proper, for Heidegger, is that thinking that meditates upon “what beings are”, “the most general of the general”, that thinking that since it thinks the most general, Being, it must then put everything under questioning, aiming to account for all

that is, thus also these very general domains. Heidegger writes in this regard that the scientific “researcher always operates on the foundation of what has already being decided: The fact that there are such things as nature, history, art, and that this things can be made the subject of consideration. For the thinker there is no such a thing, he stands within the decision concerning what *is* in general, what beings are” (N III, 6). What one normally considers as nature, history, and art appears to be obviously known, yet they are known as the domains of beings which they now indicate, because nature, history, and art, have gone through an historical process of clarification and to what they mean and are. Yet, since in philosophy the “are” is at stake, for the thinker everything becomes questionable.

For Heidegger metaphysics aims to articulate the understanding of Being that provides the articulation of the sense of reality of a certain age. Then modern metaphysics is the onto-theological stance that articulates the modern understanding of the Being of beings that comes to prevalence in the Occident in the slow process of the rise and development of modern science. In other words, modern metaphysics aims to a configuration of the Being of beings that accounts for a new sense of what it means to be.

Modern metaphysics aims to clarify such a new understanding of Being, and delineates the modern understanding of the Being of beings onto-theologically structured in the objectivity of the objects and the subjectivity of the subject, that aims to be foundational for modern science, for modern mathematical science, as the way to learn the truth about beings, as will be delineated below.

The basic approach to the Being of beings delineated by modern metaphysics is that knowledge be objective, and this plays out in all the positive sciences which in their

posits must objectify their subject matter, and proceed in such an objectification. In other words, for each of the positive sciences, Heidegger points out, there are the regional ontologies, ontic posits, which define the Being of the entities that comprise each of the domain of the positive sciences, that is, the Being of the entities comprising physics, biology, ecology, economics, psychology etc..

So that, in order for biology to be, an articulation of the being of living entities, of what living beings are, has to be present so that those entities can be found at all, and thus engaged in the ways proper to their nature, their Being. Heidegger points out that what a living beings is, what biology is, cannot be reached with the methods of research of biology, but by a thinking that is philosophical. Such a thinking, Heidegger considers, does not think from a vacuum, but from what is already known about living beings, from its familiarity with living beings, which are already disclosed to it as the kind of beings they are in “in order to” of daily life, from here it aims to clearly articulate the nature of living beings.

Heidegger writes that

Ontic sciences in each case thematize a given being that in a certain manner is always already disclosed *prior* to scientific disclosure. We call the sciences of entities as given-of a *positum*- positive sciences. Their characteristic feature lies in the fact that the objectification of whatever it is they thematize is oriented directly toward beings, as a continuation of an already existing prescientific attitude toward such beings. Ontology, or the science of being, on the other hand, demands a fundamental shift of view: from beings to being. And this shift nevertheless keeps beings in view, but for a modified attitude (PM, 41).

In this sense, Heidegger contends that both the ontological thought of philosophy and of the sciences at their inception have to abstain to engage beings in view of their use in view of human concerns, so engage them not in copying but in contemplation, that is, in view of their sheer presence, and yet this contemplative view has to have some foresight in terms of which the pure contemplation of the beings, bare of their meaning of “in the order to”, can proceed to delineate and ascertain what they are, how there are, that is, regarding their nature, their Being. Furthermore, Ontology contemplates the Being of all beings, while the positive sciences contemplate the Being of regions of beings, that is why Heidegger calls them the ontic sciences.

Thus, the staking out of the ontological posits of the positive sciences also involves philosophical thinking, what Heidegger calls the ontic moment of the sciences, the fundamental concepts that define the being of the entities of each domain of the positive sciences, which already happens within a diffuse pre-ontological understanding of the Being of beings, that comes to be articulated in modern metaphysics, in modern ontology. Ontology, metaphysics, as the delineation of the Being of all beings, aim to be inclusive and generally guiding for all knowledge, and thus stand related to the positing of the sciences, which aim to define and study regions of beings, specific domains of beings. Indeed the sciences are positive in the sense that only after their delineation in regional ontologies, in the ontic definitions of the beings they aim to study, can they proceed forward, positively, in their respective researches, procedures, and developments.

So that the reflection regarding what modern science is, happens in metaphysics, in ontology, in first philosophy when reflection is directed toward the Being of beings, with the aim to delineate the basic concepts that bring intelligibility to the whole of

beings, that is, nature, the universe, reality. Under these revealing concepts, the assumptions that in our time sustain and guide modern science, the pursuit of any true knowledge regarding specific kinds of beings, in physics, biology, ecology, economy, etc., can, then, proceed.

The positive sciences begin by positing their subject matter, that is, its fundamental nature about that which is under scrutiny comes to be defined, which allows research to proceed in the questioning opened up by such positing. In this sense, Einstein had to be interested in the philosophical implications of the theory, because his work involved the positing of the phenomenon, regarding the nature of the phenomenon under scrutiny.

Indeed, when scientific progression does happen in revolutionary scientific discoveries, the clarity and novelty of the predictive power of the theory, is essentially related to its ontological, in Heidegger's terminology, ontic reach, a fundamentally determinative moment for the progression of the sciences. In this regard, Heidegger writes that

The real movement of the sciences takes place when their basic concept undergo a more or less radical revision which is transparent to itself. The level which a science has reached is determined by how far it is *capable* of a crisis in its basic concepts. In such immanent crisis the very relationship between positively investigative inquiry and those things themselves that are under interrogation comes to a point where it begins to totter. Among the various disciplines everywhere today there are freshly awakened tendencies to put research on new foundations" (BT, 29).

Thus philosophy, so understood by Heidegger, happens at the foundational level of any science, and of science in general. In other words, all scientific research always happens within the ontic moment of the sciences, that is to say, a regional ontology, a definition of the entities that each science occupies itself with, which means that the

being of the entities that it studies is to be made clear so that those entities can be found at all and engaged in the appropriate way. That is, guided by what and how those entities “are”, by the being of those entities, that is, in view of the first definition of these entities which opens the way to find and engage them in the specific methods of research to them appropriate. In other words, as Glazebrook, elucidating Heidegger, clearly puts it “no experiment in physics can show what physics is; nor what mathematics is itself be calculated. The essence of science is inaccessible from within the science” (Glazebrook 2000, 141).

Heidegger writes, in this regard, that “Science does not move in the *dimension of philosophy*, but, without knowing it, science relies on this dimension. For example: physics moves in space and time and movement. What movement is, what space is, what time cannot be decided by science as science” (Heidegger in Neske, and Kettering 1990, 83). In other words, any questioning, in which a positive science moves, is already based on a knowing, that opens the questioning, and this knowing is of the essence.

Thomson clarifies that “By 'essence' Heidegger means the ontological presupposition or 'posit' that guides a positive science...One is philosophizing' whenever one explicitly examines and seeks to clarify the ontological understanding that normally guides a science implicitly, but that can come into question during a period of scientific crisis” (Thomson 2005, 111).

In other words, the question regarding the essence of modern science in general, and of each positive science, happens in the dimension of philosophical thought, when reflection is directed toward the basic assumptions, the basic concepts and definitions regarding the Being of any being or any region of beings.

In *Being and Time*, Heidegger writes that

Basic concepts determine the way in which we get an understanding beforehand of the area of subject-matter underlying all the objects a science takes as its theme, and all positive investigation is guided by this understanding. Only after the area itself has been explored beforehand in a corresponding manner do these concepts become genuinely demonstrated and 'grounded'. But since every such area is itself obtained from the domain of entities themselves, this preliminary research, from which the basic concepts are drawn, signifies nothing else than an interpretation of those entities with regard to their basic state of Being (BT, 30).

In other words, the relevance of the philosophical moment in science refers to the ontic positing before and within which theories, hypothesis, and researchers can properly proceed. The positing of basic concepts define a regions of objects thematized in each positive science; this happens in the thinking that regards the nature, the essence of the beings which delineates the region of beings under scrutiny. This thinking opens, by defining their nature, the realm of entities which composes a certain specific phenomenon, like combustion, for instance, or a broad field of entities, like biology, or ecology, or the materiality of matter upon which particle physics is based.

Thus the delineation and elucidation of the nature of the domains of entities to be studied, happens for each and every positive sciences in a thinking that is philosophical, that is, ontological; as the reflection regarding the nature of the beings under study in any specific branch of science. Again, to be clear, this is more precisely not ontology, but as Heidegger calls it, the ontic posits of the sciences, the reflection regarding what is true and real regarding the entities populating a science, so these entities can be encountered as the entities so understood to be, and thus correspondingly researched.

And it is here, in this dimension that true advancements happen, as Kuhn describes in the *Structure of Scientific Revolutions*. That is, after a theoretical framework, which implicitly contains ontic posits, has been successfully tested in experimental

research, but further experiments have resulted in conspicuous and persistent discrepancies between the prediction of the hypothesis and the experimental results; such discrepancies will eventually force to assess anew, in the degree of the generality of such hypothesis, the nature of the phenomenon under study, in view of advancing a new, comprehensive of such anomalies, understanding of the phenomenon, that is, of its nature, what Kuhn calls “the ontology of the theory” (Kuhn 1996, 206). That is, progress in the sciences happen when the ontic posits are revisited in view of experimental results.

For Heidegger philosophy, in the sense of ontological thinking, is that thinking that regards the essence of things, the nature of things, i.e., the Being of beings, the approach that defines beings as beings, that is, in view of their Being. So that, ontology aims to articulate the ground of science, in the basic concepts that illuminate the Being of beings in view of which science becomes the approach to learn about all the kinds of beings, in all the branches of the positive sciences. Ontology is that thinking that questions regarding the Being of beings and which always stands related to the ontic positing of the Being of any region of beings.

In this sense, what biology is cannot be ascertain by the methods of biology, likewise science itself cannot be understood from all the methodologies of the sciences, but by a thinking that, because of the scope of what is asked, must go back to the most radical, must reflect upon the ground that validates and justifies knowledge in the proper sense as scientific. This work of reflection regarding the ground of science, what science is, how science is to proceed to produce knowledge, is, according to Heidegger, part integral of the philosophical tradition of the West, where the fundamental question of the Being of beings is taken up and addressed.

Yet, Heidegger confronts that the theoretical thinking that happens either in philosophy or in the sciences are themselves grounded in the state of Being of Dasein, that is described as being-in-the-world. The contemplative gaze of philosophy or of science is based upon this already operative knowledge, this familiarity of the human being with the world in which it exists ordinarily and primarily in practical copying, dealing with things from a background understanding of the obvious ways in which we meaningfully deal with anything in our ordinary life in the world.

Modern metaphysics articulates an understanding of Being that, not only does not account for the human being as being-always-already-involved-with-a-world, it completely skips the contemplation of this basic state of being of the human (as will be articulated below), even though it must always start and return to it. Modern metaphysics conceives knowledge as grounded in the relationship between subject and object, that is, it devolves in epistemological concerns, right because the ground of the subject-object relation, that is, being-in-the-world is missing.

In other words, when in modern metaphysics, the ground of modern science is sought and is then attributed to mathematical representing, as will be articulated below, this mathematical representing is itself based upon the basic state of the human as being-in-the-world. Thus Heidegger points out that representational thinking, the “looking at the picture”, the fundamental standard of any knowledge in all of metaphysics, from Plato onward, and especially of modernity, as also Kuhn exemplifies with the use of the duck/rabbit picture example, is, to be reconduced to that closer way of Being of the human being as being-in-the-world. That is, to the fact that, as far as a human being is, an understanding of the Being of beings is also there, and from this unitary state that is

inclusive of world, the human being can posit and theorize that knowledge proper regards the representations, the mathematical models which aim to describe, that is, to formulate the workings of the universe and all it contains.

Heidegger contends that all metaphysics lacks a reflection of the human being in view of the peculiarity of the human being, the one being who is always already dwelling in a somewhat disclosed meaning of Being, in a pre-ontological understanding of Being. The human being can become a subject that represents the objects in the models of reality because it is already dwelling in a world, that is, the world is already disclosed to it; in such a basic state, the human being is in an already interpretation of its existence, in a world, in a context of meaningful relations with other beings, and from here it can theorize and discover. That is, it can ask regarding the Being of beings, the nature of things.

For Heidegger modern metaphysics and thus modern science as valid an approach to the question of Being, it is an approach that skips an analysis of that ordinary dimension in which we all constantly dwell, which Heidegger describes as being-in-the-world, an interpretedness of world, of oneself, of Being, that is not willed right away in representing, or beliefs, it just happens in all our comporting, and this just happening, that is, the unitary happening of being-in-the-world remains elusive as to its origin, it is enigmatic. Being, the making sense of the Being of beings, of world, is for Heidegger that which is closest and yet most enigmatic.

For Heidegger, the issue of Being has not been overcome by modern metaphysics and modern science, even if the question of the Being of beings has been answered in the clearing set by modern metaphysics which delineates Being as mathematical

representing.

For Heidegger contends the understanding of Being elucidated by philosophy is, overall, inherently problematic, that is, it always shows an incompleteness, it does not completely account for Being, indeed it keeps changing.

For Heidegger the question of Being is not exhausted by the historical interpretations of Being, which only temporarily delineate the meaning of Being. As Thomson writes, the meaning of Being, the understanding of Being of a time “effectively 'holds back' the floodwaters of ontological historicity for a time – the time of an 'epoch'” (Thomson 2005, 20). The understanding of Being of an epoch gives rise to our world, as Thomson puts it, it gives rise to “our worlds of meaning without ever being exhausted by them, a dimension of intelligibility we experience primarily as it recedes from our awareness, eluding our attempts finally to *know* it” (Ibid., 27).

That is to say, Heidegger contends, these historical interpretations of the Being of beings, never completely account for Being, that is, they are finite accounts, that is, incomplete. The understanding of Being, implicit in being-the-world, which ultimately propels all intelligibility, itself remains elusive to be accounted for, that is, as the clearing of the Being, it makes beings intelligible visible in an onto-theological stance, yet what allows the clearing, itself remains invisible.

Within the Western philosophical tradition, Heidegger's novelty can be attributed to this insight, the human being as being-in-the-world, a being who dwells in an understanding of Being, which does not mean that the human being wills a set of beliefs and assumptions and then lives in their enlightening light, which is indeed a possibility of its being, but before that the human being, as “the open that we are” (Dasein), always and

already finds itself in an interpretation of itself and world. The human being is always found, in all that it does in a not completely clear understanding of what it means to be, that is operative in all humans do, but that itself remains elusive to be clearly articulated in its ground.

And even when it is articulated, when it is thought out in philosophy and science, this articulation remains incomplete, indeed it keeps changing. As Heidegger describes this, the understanding of the Being of beings opens the intelligibility of all beings, so that beings are understood and known, but the ground of this pre-ontological understanding of Being and world, the referential whole of meanings in which beings are, itself remains elusive in its origin.

So that, in a move away from the foundation for all the Western philosophical tradition, Heidegger will point, together with the archaic Greeks, toward Being as that which bestows. Being bestows the intelligibility of beings to human beings, and yet itself remains elusive. The enigma of Being is the first look upon the human, by which the world comes to be intelligible disclosed, the theories of philosophy and science are the returning gaze of the human to this previous look.

In other words when the question of Being as Being is asked, as in archaic Greece, it results to be enigmatic, elusive; and when it is answered in the onto-theological stances of Western historicity, these never account comprehensively for the fullness of Being, indeed in the onto-theological answers to the question of Being, the question of Being as Being remains not only unanswered but completely unquestioned. For Heidegger then Being is the most enigmatic, even though, it is the closest. In this regard, Rojcewicz writes that

For Heidegger, Being is *the* mystery, and what is most mysterious about it is its ambiguous way of disclosing itself. It offers itself, but in its very offering of itself it holds itself back. In the very act of stepping forth, it recedes...Being makes available an open space (an understanding of what it means to be), but just as the openness of the open space is most easily overlooked in favor of the things that stand in it, so Being withdraws in favor of beings. A knowledge of Being is first, closest to us, presupposed by all other knowledge. Yet Being offers itself in such a way as to recede in favor of what is next closest, beings. Being conspicuously sheds light of beings and very reticently sheds light on itself...Being reticently shows itself and emphatically recedes. It is first to be experienced and last to noticed, closest and furthest, most known and least known, most obvious and most overlooked. That is why Being is *the* mystery (Rojcewicz 2006, 176).

And that is why, for Heidegger, any philosophy that thinks itself logical, that proceeds in view of rational rules estranges itself from the enigma of Being. For Heidegger Being is the enigma, in that it is the closest question, in whose answer the human constantly dwells, in its very existence, and yet it is elusive to a final definition, making it the most worthy question for philosophy, that is, for thinking.

No other philosopher has pursued the question of Being so relentlessly as Heidegger has throughout his voluminous work, his ‘ways’. For Heidegger all his works are simply “ways” into this question. In this regard, Grondin writes that in the “102 volumes...planned in the *Collected Edition* (GA), which Heidegger says in a draft of a preface presents only ‘ways, not works,’ whose sole aim is ‘to incite [readers] to pose this question in an ever more questioning way’” (Grondin in Polt 2005, 17).

1.10 The Interpretations of the Being of Beings as History

The Hermeneutic of the Historical Interpretations of Being with Phenomenology as its Method

The understanding of Being, which Heidegger contends, is always already

happening in all that we do, is an interpretation of the Being of Beings. In order to interpret one has to have already a set of interpretative directives, premises, assumptions, basic concepts, categories, values, that is, interpretation happens in view of an already presumed guiding approach. In other words, in that the human being is, it already dwells in an operative and somewhat explicit understanding of Being.

For Heidegger, the philosophical thinking that is ontological, that is metaphysical, has always to go back to this already happening understanding of Being. In this already happening understanding of Being, the human being is, that is, it lives its historical and personal life. For Heidegger, the philosophical works of metaphysicians aim to articulate such approach in basic concepts that are presumed in the historical interpretations of the Being of beings.

We always are and move in all our interactions with beings and ourselves within an understanding of the Being of beings, which is interpretative and usually not explicitly articulated, it can become thematic in ontological reflection, in metaphysics. Since this pre-conceptual understanding of Being is interpretative, for Heidegger then, ontological thought is in its basis hermeneutic.

Traditionally, hermeneutics was the discipline for interpreting sacred texts, and later any text, in the full explication of their meaning. Heidegger conceives hermeneutics as the interpretative task of the Being through the human being; and also as the clarification of the historical interpretations of the Being of beings.

Through the hermeneutic of the literary philosophical tradition of the West, Heidegger aims to clarify the various historical interpretations of the Being of beings. Such interpretations of the Being of beings (as one would say today: the fundamental

assumptions regarding the nature of reality) guide the encountering of each entity encountered; that is, any interaction with any entity presupposes that the being of those entities is understood, that is, interpreted in advance, by Dasein, by the openness that we are.

Heidegger contends that however the Being of beings is understood to be, it is in the way of an interpretation. The hermeneutic work of Heidegger aims then to retrieve the different interpretations of Being as the historical epochs of Western culture, by de-constructing, by clarifying these interpretations of Being.

And for Heidegger, like the interpretative task of traditional hermeneutics which was to interpret the text, as Palmer puts it, “by going behind it” (Palmer 1980, 146), hermeneutics is to bring to clarity that which is hidden in these historical interpretations of Being, bringing to light that which was previously obfuscated, unclear, or unsaid in them. That is to say, this hermeneutic task, as Palmer writes, also “carries its deeper traditional overtones of bringing out a *hidden* meaning, of bringing what is unknown to light” (Ibid., 146).

Heidegger aims to retrieve the authentic structures of Western metaphysics that delineate the meaning of Being for each epoch of history, and that lead to the rise of modern metaphysics and modern science. For this retrieving to be authentic, Heidegger employs the phenomenological method to the hermeneutic of Western philosophy, understood as the de-construction of the Western philosophical tradition in view of reopening the question of Being.

It was Edmund Husserl who first delineated phenomenology as a method for philosophy. Husserl became acutely aware that modern philosophy does not ground science anymore,

but is left to endless diatribes and currents, but no overall programme, no unity. This urged him toward the establishment of phenomenology as a new way of philosophy.

Phenomenology is not a philosophy that asks regarding values, that is, a set of categories, of basic concepts. Before that, phenomenology returns to reflect upon the very happening of phenomena in the very state of happening for the human being.

Phenomenology then, precisely aware of the assumptions that go into every knowing, aims, in reflection, to retrieve and make clear the structures in which any phenomenon shows itself to us, coming to intelligibility to us.

Phenomenology is a method on how to come to terms with any phenomenon, in its being there for us. Phenomenology is descriptive, conscious that every description is already an interpretation of that which is described, an interpretation based on some assumptions, which beforehand already delineate the approach to interpret the phenomenon.

Husserl strove toward a philosophy that would aim to delineate a ground for all human knowing, and thus for modern science at large, in a presuppositionless beginning. Simply put, and only roughly, Heidegger, who gave credit to Husserl to have been essential to his own formation in the phenomenological method, considers that assumptions are unavoidable.

The phenomenological method dictates that any knowledge is to be gathered in the evidence of the data from the phenomena themselves, attentive to how the phenomena show themselves, so that they can be conceptualized, and this is not to be imposed on them or misread from them. In the attentiveness to all assumptions, presumptions, prejudices, and set views that might go in the gathering of the original data, to let that

which manifests be brought to articulation as it shows itself from itself, that is a definition of phenomenology. Heidegger writes in *Being and Time* that “Phenomenology means...to let that which shows itself be seen from itself in the very way in which it shows itself from itself” (BT, 34).

Phenomenology can be described as the method utilized in the attempt to retrieve how any phenomenon comes to be for the human being, attentive to all operative assumptions and prejudices, thus attempting to better and fundamentally understand any phenomenon by going back to the modalities in which it comes to appearance at all, how it comes to be at all, as itself shows itself to a human knowing. That is why the guiding motto of phenomenology is to “to the things themselves!” or “back to the origin!”

Phenomenological reflection does not right away jump to the concepts that define the phenomenon under contemplative scrutiny, instead the phenomenological method is pursued by aiming to patiently stay with the phenomenon, until the nature of the phenomenon is described from the phenomenon, staying close to describe the ways it show itself to us, the ways in which it comes, and is in our knowing. Thus Heidegger writes “Before words, before expressions, always the phenomena first, and then the concepts!” (HCT, 248).

Phenomenology aims to describe how any phenomenon shows up at all, how it comes to appearance, not only in view of the concepts with which is already understood to be, but in the questioning of the grounding of the those concepts in the very way the phenomenon shows up, appears, is. The task of phenomenological research is to describe, analyze, and interpret the original data of any phenomenon.

In aiming to clarify the historical interpretations of the Being of beings, Heidegger

must clarify the approaches, the presuppositions that have guided the historical understanding of the Being of beings. The Being of beings is the original data that is articulated in the works of the philosophers, the metaphysicians, who aim to articulate the one comprehensive phenomenon in which all phenomena are: Being.

For Heidegger, in the context of the de-construction of the metaphysical tradition of the West, the phenomenological method is to be conducive at carrying a hermeneutic of these historical interpretations of Being, as from within, without imposing assumptions and concepts that do not belong to them.

The hermeneutic of the historical interpretations of Being, that have preceded and helped shape the modern metaphysical stance which sustains modern science, is accomplished through the phenomenological method, that is, without any assumptions, and especially that of the supposed superiority of modern times.

Thus Heidegger warns that one has to be careful not to “‘paint’ over the old and bygone with the gloss of the respective present” (BC, 6), that is to say, through our own modern interpretation of Being. Instead, the phenomenological hermeneutic of such interpretations of Being aims to bring to clarification such interpretations by bringing to light that which is inherent in them, in view of that which they aim to make clear: the Being of beings.

Phenomenology then becomes the method for the hermeneutic investigations of the historical interpretations of the Being of beings, which are articulated by philosophers. Of course, Heidegger retrieves the history of philosophy from the works of philosophers, this is the interpretation of literary works, but it is always the interpretation of the meaning of Being articulated in such works, the historical understanding of the

Being of beings, that is the focus.

For Heidegger philosophy is ontological reflection, which in order to return to the question of Being, is to go through the phenomenological hermeneutic, the deconstruction, of the Western metaphysical tradition, so that as Schrag puts it “Historical existence itself becomes the subject of a hermeneutic interpretation and phenomenological description” (Schrag in Kockelmans 1967, 278).

Thomson writes that “For Heidegger, philosophy is essentially the activity of ontological questioning (although later he will usually call this activity 'thinking' in order to distinguish it from metaphysics). In his 1928-1929 lectures, *Introduction to Philosophy*, he says that 'philosophy is not the knowledge of wisdom...Philosophy is philosophizing” (Thomson 2005, 111).

Philosophy is thinking, reflection upon the closest and most general: Being. Thomson reports on Heidegger giving this, unconventional, interpretation of the etymology of the word philosophy, “*philia* as 'a genuine friendship which, in its essence, struggles...for that which it loves' and *sophos* as 'an instinct for the essential' and so defines philosophizing, the active practice of philosophy, as the struggle to employ one's sense for the essential” (Ibid., 111).

For Heidegger of the essence is the question regarding Being itself, which in the Western metaphysical tradition takes the form of the question regarding the Being of beings and Being as a whole. It is in this onto-theological structure that the guiding question of philosophy takes place; a questioning that essentially includes the question regarding the Being of the human being itself, and the sense of truth of an age. This questioning is indeed possible in that the human being is always already found in a pre-

ontological, that is, pre-conceptual understanding of the Being, an interpretation of what is fundamentally true and real.

Thus on the way to return to the question of Being, this is one of the tasks of philosophy for Heidegger, as the striving questioning toward the essential, philosophy is to thematize this anticipating that happens for every knowing, the always already operative, historical, pre-ontological understanding of Being, in which we are, and which as been articulated in the works of the metaphysicians. Heidegger focuses on the history of the understanding of Being, aiming to retrieve the historical onto-theological answers to the question of Being, in the concepts delineating the Being of beings and Being as a whole, with the final aim to prepare the return to the question of Being as such.

To be clear, for Heidegger, the human being gives meaning to existence, even when not one word is ever uttered about this meaning, because in all our comportments and finds a certain interpretation of the Being of beings is already present, and it is present because it happens through us, and, at the same time, in view of beings. Humanity gives some meaning to existence which structures all its relations to the beings toward which we constantly already are, already involved with them meaningfully.

Philosophy aims to make this basic meaning of Being clear, a meaning that is already at play in the philosophers, who then attempt to bring it to the clarity of language, of fundamental concepts. For Heidegger, though, of the essence is not only to articulate a new meaning of Being, indeed a task for philosophy, for ontological reflection, but to ask regarding the ground for Being as Being, for the possibility of making sense at all, not as an active striving on the part of human as the thinking subject, but in the always already happening of meaning, of the pre-ontological making sense of the Being of beings which

happens through the human being.

1.11 The Phenomenological Hermeneutic of the Philosophical Tradition of the West as the History of Being.

The History of Being as the Context for an Answer to What Modern Science Is

To ask regarding the current metaphysics of Western culture is to ask regarding the predominant interpretation of Being, the fundamental understanding of reality, that underlies modernity and is grounding for modern science. In articulating the approach and thus the answer to the question of Being that takes place in modernity, I will draw from Heidegger's phenomenological hermeneutic of the history of Western metaphysics.

In that Heidegger “ontologizes” history, history is not the reconstruction and recounting of events past gone, but the interlinked succession of the metaphysical stances that delineate Being and in so doing all beings, that is, the fundamental approach to the question of Being, answered in the basic concepts which delineate what it means to be, which give meaning to all comportments, to all beings, to all events, in and by which beings are, and in which the human being stands as the being that it understands itself to be, in the approach toward that which is, Being, that which is real and thus truthful.

Heidegger engages the whole history of philosophy from the pre-Socratic philosophers to modern times in view of the question, how does it stand with Being? Heidegger considers the history of the West as the history of metaphysics, i.e. of those events that “ground and illuminate an age”. In this regard, Thomson writes that

These epochal ‘constellations of intelligibility’ are...grounded in and reflect a series of historical transformations in our metaphysical understanding of what entities *are*. Straightforwardly enough, Heidegger calls such an understanding of what it means for

something to be an *understanding of being*, and his famous *history of being* is simply a shorthand for designating the historical series of these epoch-grounding understanding of being (Thomson 2005, 9).

Heidegger engages the whole history of philosophy in view of the question how does it stand with Being? He does not report on this question only as a chronology of answers. Reopening the question, he retraces how it has evolved as the epochs of Western history, as interlinked metaphysical stances that have evolved from each other. For Heidegger the past is not a series of consummated events; but the past, as this tradition, is still present in our contemporary times, in that it has helped shape our current interpretation of Being, our current onto-theological stance.

The de-construction of the Western philosophical tradition is pursued in constant view of the question of Being, that is, in view of the fact that the Being of beings has been interpreted in different ways and thus that the Being of beings harbors such possible interpretations, in its responsiveness to these historical interpretations. The aim is to retrieve, in clarity, the approaches that have been indeed possible historically, that is, as the historical ways to interpret Being. Heidegger aims to clarify this tradition and thus our modern stance, with the final aim to return to reopen the question of Being, that is, of Being as such.

Philosophy, as ontological questioning, as the striving for the essential, can bring to question Being as Being, or can bring to question Being in the questions regarding the Being of beings, and Being as a whole, or can question the Being of the entities populating any domain of nature or history, in each branches of the sciences.

It is in modern metaphysics that the understanding of the Being of beings is articulated as ground for modern science and thus of all the sciences, where in the

assumptions and methods of each specific science, knowledge about any phenomenon is produced.

What is asked about in this thesis is the clarification of such fundamental metaphysical stance, by which knowledge as knowledge is defined. That is, what is asked is not regarding the knowledge of specific beings or specific groups of beings, already scientifically understood, but the definition of what knowledge is in general, that which opens the knowledge of all beings as beings, that which is true regarding all beings, so that modern science becomes the way to learn the truth about any being. Thus grounding scientific knowledge, as true knowledge, beyond any success, inconsistency, and even error.

A reading of Heidegger's history of Being is carried to provide an answer to the question of what modern science is, in order to better understand science, right in view of the paradox that in the age of science, environmental degradation becomes almost normalcy. Furthermore engaging Heidegger's history of Being wants to show the educational relevancy of philosophy, and here philosophy is understood as Heidegger understands it, as thinking that strives for the essential, as ontological questioning and reflection.

In other words, the aim is to emphasize the relevance, in the pursue of knowledge, of that thinking that not only thinks how to split an atom in a chain reaction, or that can catapult a manned or unmanned spaceship into the solar system and beyond, or can calculate the probability of a species to go extinct, but that thinking that reflects upon the meaning of these scientific discoveries and accomplishments, that thinks regarding that understanding of the Being of beings, that fundamental sense of reality, that makes it

possible to discover and split the atom, or space flight, or ecological restoration, or wildlife management, or factory farms, that aims to make clear the understanding of Being present in all such ways of scientific modern humanity.

The aim of this thesis is to propose that a key ingredient for better environmental education and science education in general, in view of the current host of environmental problems, is philosophy, and that is, ontological reflection. Heidegger stresses that ontological questioning is to be pursued especially today in view of “the crippling of all passion for questioning, a crippling that has already held us back for too long” (IM, 152).

For Heidegger philosophy is that thinking that questions regarding the essence of things, that is, regarding the general nature of all things, as he puts it, the Being of all beings; but also regarding the Being of any domain of beings, or any scientific problem, or any specific existential situation. It is from this questioning that new solutions, that new possibilities arise.

I articulate a reading of Heidegger's history of Being in order to clarify what science is from his phenomenological hermeneutic of the philosophical tradition of the West, of the historical interpretations of the Being of beings. That is, the clarification of the metaphysical tradition that is foundational for modern science is carried in order to better understand what science is, so as to give a sense of the relevance that philosophy has for science, and thus inherently for science education.

Thus, I provide a reading of Heidegger's History of Being. Such a reading is supported by a number of Heidegger's commentators and translators that have worked toward the clarification, and interpretation of his work, his “ways”.

Among Heidegger's commentators, the following authors have been especially

helpful to clarify the scope, context, and terminology of Heidegger's phenomenological hermeneutic of Western philosophy. They are: Richard Rojcewicz in his book *The Gods and Technology A reading of Heidegger* and his translation of Heidegger's lecture *Parmenides*, who helped clarify Heidegger's basic delineation of pre-Socratic and ancient and modern metaphysics; Iain Thomson, the author of *Heidegger on Ontotheology Technology and the Politics of Education*, who has helped clarify Heidegger's thought on metaphysics as onto-theology; Hubert L. Dreyfus with his commentary *Being-in-the-world* on Division I of *Being and Time* and other papers, who helped to clarify the initial section of Heidegger's first and most famous work *Being and Time*, and his novel ontological description of the human being as being-in-the-world; Walter Brogan, the author of *Heidegger and Aristotle* for shedding light on Heidegger's interpretation of Aristotle, and thus clarifying the philosophies of Aristotle and Plato that have been seminal for the development of Western culture; And Thomas Sheehan, who helped clarify the overall scope of Heidegger's thought.

Heidegger delineates five major overlapping epochs of ontological understanding as the history of Being: the Pre-Socratic, the ancient Greek, the Medieval, the modern and late modern. Furthermore all these can be delineated in two major periods: the pre-Socratic, that is, the archaic Greeks, the very beginning of philosophy; and ancient (classical Greek, Roman, and Medieval) and modern metaphysics. This major division is drawn out of the shift in approaching the question of Being from the archaic asking of the question of Being, as the question of Being as such and as a whole, that is, the question of Being as Being, to the asking of the question of Being exclusively in terms of beings, that is to say, onto-theologically, in view of a supreme and most common being. Within the

onto-theological approach, initiated during the time of classical Greek philosophy, the whole of the Western historical understanding of Being develops.

A summary account of archaic and ancient, that is, pre-Socratic and classical Greek philosophy, will be delineated first. Followed by an account of the rise of modern metaphysics with Descartes from the Medieval/Scholastic understanding of Being, that is, from and against ancient Greek philosophy as reinterpreted by late Scholasticism, out of which and against which, Heidegger contends, modern metaphysics arises.

The beginning of modern metaphysics and its development will then be delineated, specifically, through Heidegger's hermeneutic of the rise of modern classical physics in the works of Galileo, Newton, and Descartes. This is followed by Heidegger's hermeneutic of Kant's *Critique of Pure Reason*, as the continuation of the articulation of the modern metaphysics initiated by Descartes grounding the validity of modern mathematical science.

The last philosopher considered will be Nietzsche, as the representative of the understanding of Being that becomes prevalent at the end of the twentieth century, and in our current time.

CHAPTER 2

A Reading of Heidegger's History of Being: Archaic and Classical Greek Philosophy

To retrieve, the history of Being, that is, the history of the understanding of Being of the West, of the successive interpretations of Being that sustains our culture from within, the itinerary starts in ancient Greece.

2.1 The Meaning of Being and of the Truth in Archaic Greece

How did the ancient Greeks experienced and thus formulated and answered the question: how does it stand with Being? In pre-Socratic times, the archaic Greeks called Being *phusis*. Heidegger asks “Now what does the word *phusis* say?” what does it refer to? It refers to, it indicates, Heidegger writes,

what emerges from itself (for example, the emergence, the blossoming, of a rose), the unfolding that opens itself up, the coming-into-appearance in such unfolding, and holding itself and persisting in appearance-in short the emerging-abiding sway...*Phusis* as emergence can be experienced everywhere: for example, in celestial processes (the rising of the sun), in the surging of the sea, in the growth of plants, in the coming forth of animals and human beings from the womb. But *phusis*, *the emerging sway*, is not synonymous with these processes, which we still today count as part of 'nature'. This emerging and standing-out-in-itself-from-itself may not be taken as just one process among others that we observe in beings. *Phusis* is Being itself, by virtue of which beings first become and remain observable (IM, 15).

In other words, Being as *phusis* encompasses and is all beings, their coming to being and persisting there, but is not drawn from beings.

There is not in the way beings confront us a precise indication of what *phusis* is. Heidegger says

It was not in natural processes that the Greeks first experienced what *phusis* is, but the other way around: on the basis of a fundamental experience of being in poetry and thought, what they had to call *phusis* disclosed itself to them. Only on the basis of this

disclosure could they take a look at nature in the narrower sense. Thus *phusis* originally means both heaven and earth, both the stone and the plant, the animal and the human, and the human history as the work of humans and gods; and finally and first of all, it means the gods who themselves stand under destiny. *Phusis* means the emerging sway, and the enduring over which it thoroughly holds sway. This emerging, abiding sway includes both 'becoming' as well as 'Being' in the narrower sense of fixed continuity. *Phusis* is the event of *standing forth*, arising from the concealed and thus enabling the concealed to take its stand for the first time (IM, 15-16).

In his reading of the pre-Socratic philosophers, Heidegger interprets the meaning of *phusis*, of the word for Being, as denoting the whole of all beings and their becoming, but also as the unity that defies being understood as the adding up of all beings and their processes of becoming, rather *phusis* points to the whole that, without being detached from beings, underlies beings in their presencing, yet, at the same time, withdraws itself.

Being as *phusis*, is the presence of beings in all their manifestations, and was for the pre-Socratic understood as unconcealment, of all the beings that come to unconcealment, that is, that come to appearance, as existent, and thus appear at all for a human encounter. In other words, in that the unconcealment of beings, in the very presencing of beings, is guided by *phusis*, both in the fixidity of their being present and in their constant becoming, *phusis* appears in the multiplicity of all beings and yet it conceals itself as itself.

In that beings unconceal themselves in presence, they open themselves up for a human knowing, which is here not the modern pursuit of knowledge or however perception is understood in scientific (neurological, biological, social) terms. Heidegger contends that for the archaic Greeks in that *phusis* holds sway, also the human stands itself in the sway of *phusis*, so that the human can gather knowledge of beings in their appearing, in their presence as to what they are, and regarding their constant becoming.

For the Greeks, straightforward perceiving of that which stands before us, beings, as what they are and in their becoming, the very ordinary appearing of the presence of beings was the ground itself, the unconcealment of beings in and by *phusis*, in whose sway the human being stands also.

Heidegger interprets that, for the ancient Greeks, knowledge was not the obvious, modern conception that knowledge is a human producing, that we gather knowledge. Our modern sense of truth is understood in the sense of *veritas* from the Latin translation of the ancient Greek word for truth *aletheia*. In the Latin word, as for ourselves, *veritas* has a positive connotation, the positive reaching out toward the truthful knowledge regarding beings. For the ancient Greeks *aletheia* has a negative connotation as un-concealment of that which appears under and as the sway of *phusis*, in which the human being himself stands, as if the being human was itself gathered by *phusis* toward itself and other beings. So that knowledge, the truth, was more akin, first to a hearing, and then to the speaking of the truth.

Heidegger articulates in more detail his interpretation of the pre-Socratic Greeks in many lectures which are beyond the scope of this thesis; the lecture on *Parmenides* is especially recommended for further study. I mostly refer instead, to other lectures, in which Heidegger takes a more summarily approach, especially, as he does in *Introduction to Metaphysics*.

Heidegger's rendition of the Greek word *phusis* is the interpretation of the understanding of Being of the pre-Socratic which Heidegger proposes as the original conception of Being experienced by the pre-Socratic Greeks. In this interpretation *phusis* refers to the pervasive, ultimate *power* that commands, that dominates, that holds sway

over, and at the same time, is the presence of all beings; out of this overwhelming power all beings come to be and are. In Heidegger's reading, *phusis* does not name a being, it is not a being, but the presence of all beings. *Phusis* allows beings to be present, in unconcealment, that is, known as the beings that they are, but this ground itself remains imperscrutable. Heidegger's hermeneutic attempt to interpret the original meaning of *phusis*, is not the usual interpretation which is based on the interpretation that was later operated when *phusis* was translated in Latin as *natura*, as nature, and thus understood in the sense that is closer to our conception of nature, as articulated below.

The understanding of Being that lives in the meaning of the word *phusis*, persists according to Heidegger, in all Greek philosophy but predominantly in the philosophical period referred to as the pre-Socratic time, the time of philosophers such as Parmenides (early 5th century BCE) and Heraclitus (c. 535–c. 475 BCE); but takes in later philosophy, according to Heidegger, different connotations, which eventually lead toward modern metaphysics. Pre- and post-Socratic philosophies are indeed the usual point of division in the history of Greek philosophy. In Heidegger's interpretation, this marks a subtle shift in the experience of Being that lies at the base of the humanism that later takes hold in Europe, thus providing the historical fundamentals of modernity when, as it is obvious for us today, knowledge becomes a human affair, knowledge becomes a human production.

Rojcewicz writes that in the Socratic tradition, truth is an unproblematic, though no doubt arduous, human affair. Truth is the product of the human research which wrests information from the things. For the pre-Socratic philosopher, Parmenides, on the contrary, truth is a goddess, one that leads the thinker by the hand. As Heidegger emphasizes, Parmenides does not speak of a goddess of the truth, a divine patron of truth, but of truth itself is a goddess (Rojcewicz 2006, 3).

Rojcewicz notes that this strikes us moderns as non-sensical, in view of the overcoming of the superstition of ancient times by the establishment of the rule of reason and by modern science as the measure of all truth, that is, the rationality of the human being. It is obvious to us that “Humans are the protagonists in the search for truth, they take the initiative,...they think 'out of' themselves, and Being is the passive object...there is nothing more autonomous than our own subjectivity (Rojcewicz 2006, 3). For Parmenides and the pre-Socratic philosophers it is the opposite, it is not the philosopher, the thinker, the human that lies his claim to Being, to knowledge but “philosophy is a response to a claim made upon the thinker by something beyond” (Ibid., 3) the thinker, that is, by Being itself.

When *phusis* becomes translated, in Latin, it is translated as *natura*, which means “to be born”, birth and to grow. Of this translation of *phusis*, which originally meant that which emerges-out-of-itself and endures in constancy, into the new meaning of Being as *natura*, Heidegger writes that

the original content of the Greek word *phusis* is already trusted aside, the authentic philosophical naming force of the Greek word is destroyed. This is true not only of the Latin translation of *this* word but of all other translations of Greek philosophical language into Roman...The Roman translation then became definitive for Christianity and the Christian Middle Ages and then creates those familiar representations and conceptual terms that are used even today to understand the inception of Western philosophy. This inception is taken as something that we have left behind long ago and supposedly overcome (IM, 14).

The articulation of the retrieval of the original meaning of *phusis* for the Greeks from the obfuscation of its absorption into Roman culture, and subsequently into Scholasticism, vividly exemplifies how each epoch *is* a different approach to the enigma of Being, and how each reinterprets the past in view of its own understanding of Being, in the signification of words, of language, to indicate thus making manifest “what is being

talked about” (BW, 78).

In the questioning regarding Being, the word *phusis* refers to, indicates Being, what today we call reality, which for the ancient Greeks was the overwhelming power, emerging in all the manifestations of beings, and in so doing sustaining them in their constant presence and changeability. Today this sounds primitive and non-sensical in that Being is understood as human representing, in all the theories and their experimental factuality, so that Being, reality is sought, for instance, in the research for the unification of the four fundamental forces of physics: electro-magnetism, weak and strong nuclear, and gravitation, and the process of evolution, in the branches of biology, genetics, etc.. In the modern understanding of Being, human representing becomes the word for Being, its ground, as will be articulated below.

In the Romans’ appropriation of the Greek word *phusis* as *natura*, in the translation of *phusis* into the new meaning of Being as *natura*, Heidegger contends that Being as the whole of beings emerging out of itself and enduring in the unconcealment of presence, that which holds sway over any presence, in the being of all beings, human beings included, fades away. In this translation, and thus reinterpretation, the Greek conceiving of Being as the responding to the claim made upon the being human by Being itself disappears. So that, Heidegger writes

if one understands *phusis*, as one usually does, not in the originary sense of the emerging and abiding sway but in its later and present meaning, as nature, and if one also posits the motions of material things, of atoms and electrons- what modern physics investigates as *phusis*- as the fundamental manifestation of nature, then the inceptive philosophy of the Greeks turns into a philosophy of nature, a representation of all things according to which they are really of material nature. Then the inception of Greek philosophy in accordance with our everyday understanding of an inception, gives the impression of being, as we say say once again in Latin, primitive (IM, 16).

Heidegger points out that today, *phusis* still endures in what modern science

investigates as nature, as physics, which is essentially conceived as “the motion of material things, of the atoms and electrons”. That is, nature is conceived to be all things are held to be of a material nature, in accordance to this approach we speak of reality as the totality of material things and the forces pertaining their motions. The interpretation of *phusis* is restricted to nature as material nature, as physics, so in this sense when looking back in considering the originary meaning of *phusis*, the Latin interpretation prevents the insight into the true meaning of *phusis*, this permits the common held view that Greek philosophy is the primitive, rough beginning of Western philosophy and science.

This also happens with medieval Scholasticism which takes the Latin translation of *phusis* as *natura*, transposing it over the original significance of *phusis*, and is thus able to call the Greeks pagans. As in this case and in all other translations of the Greek philosophical language into Latin, they transform the original intent of those words, thus missing, according to Heidegger, their original meaning.

How did the pre-Socratic Greeks specifically experienced Being? *Phusis*, as Being, is the overwhelming power that self-emerges into the light, the “*emergent shining*”, making its own space, its own site thus appearing, unconcealing itself in the manifold of beings in their constant presence. Heidegger writes that

To be a being-this implies be made manifest, to step forth in appearing, to set itself forth, to pro-duce something...Not-Being, in contrast, means to step away from appearance, from presence. The essence of appearance involves this stepping-forth and stepping-away, this hither and hence in the genuinely demonstrative sense. Being is thus dispersed into the manifold of beings (IM, 108).

Being, as coming-to-presence, happens in the appearing of beings in the self emerging of the manifold of all beings.

Thus Being is the appearance of beings, the coming to manifestation of beings in

their standing. And in appearing, in their manifestations, beings offer an aspect, a look, a view. In that beings come to appearance, in the basic sense of coming to manifest in Being, they offer a look of themselves, what the Greeks called *doxa*.

Heidegger gives this nuanced interpretation of this word, he gathers from the study of ancient texts. He writes that “*Doxa* means aspect—namely, the respect in which one stands. If the aspect corresponding to what emerges in it, is an eminent one then *doxa* means brilliance and glory” (IM, 108). He continues writing that “*Doxa* is the respect...in which someone stands, and in a wider sense, the aspect...that each being possesses and displays in its look...(eidos, idea). A city offers a grand vista. The view that a being has in itself, and so first can offer from itself, lets itself then be apprehended at this or that time, from this or that viewpoint” (IM, 108).

In other words, beings in their appearing can present, can offer out of themselves various aspects, with different levels of accessibility to the human knowing encounter. In their appearing, beings presents themselves in various aspects to the human onlooker (IM, 109). In summarizing the different meanings associated with *doxa*, Heidegger denotes these four: “1) aspect, or respect, as glory; 2) aspect as the sheer view that something offers; 3) aspect as merely looking-so, 'seeming' as mere semblance; 4) a view that a person construct for himself, opinion. (IM, 110). In the multiple meaning of *doxa* as appearing that offers a view lies the human possibility to participate in the glory, in the brilliance of the appearing, in the eminent aspect of that which appears; or participate in the look of the sheer presence of beings; or participate in what only appears so and so, but it isn't, semblance; or into the mere construction of an opinion.

The unconcealment of beings as appearance, as presence, their being present, is

and can be, simultaneously and ambiguously, first an appearing, a stepping into the light but also, on the ground of their appearing, a seeming, offering a distorting view.

Heidegger points out that “Only what can show itself is capable of semblance” (Heidegger in Brogan 2006, 28). In other words, appearing for the Greeks has a power of its own, it is not dictated first by a human looking, by human representing, or perception.

Indeed at the beginning of modern metaphysics the appearance of beings, their straightforward perceived presence, becomes dubious, as the secondary qualities of objects. For modern westerners, the word appearance loses the compelling power it had for the ancient Greeks, in the sense of bringing-forth beings in their standing out of themselves, out of which then a deceiving is possible, a deceiving that happens from the side of the appearing, which makes possible the distorted view of the human looking and appraisal.

This coming-to-presence, the appearing that discloses the Being of beings, is the context out of which the meaning of the word *aletheia*, truth can be discerned. For the ancient philosophy of the pre-Socratic Greeks, truth has a negative connotation in the sense that *a-letheia* means dis-closing. The truth is the goddess or Being itself that reveals itself to the human, thus allowing in advance an insight in the being of any being, so that a relation, a comportment, an active approach is established with and toward the entity whose truth is revealed.

In this regard, Rojcewicz writes that

A-letheia names Being itself in its work of disclosing itself in advance: in advance of-and making possible- a human relation to beings and a human disclosure of beings. In short the Greeks saw beyond human truth, and the word *a-letheia* names that which they saw there: Being in its un-concealment, the self disclosure of Being, the look of Being. Their word is negative because they understood humans to play a secondary role and regarded Being as the lead (Rojcewicz 2006, 53).

In the modern meaning of truth, the truth, Rojcewicz writes, “exists when some human subject forms a judgment that corresponds to some objective state of affairs” (Rojcewicz 2006, 50), i.e., the truth is an issue that belongs in the field of human activity: the correspondence of our intellect in the propositions of language to the things. Rojcewicz writes that “The Greeks experienced an ascendancy of Being over human subjectivity”, we experience no such an event, “For us, the way to truth is research. We must ‘go around’ (=‘re-search’) and seek” (Ibid., 52).

In this understanding of truth as *aletheia*, truth is not just the perceiving of entities but the human participatory insight which opens the access into their Being, their eminent aspect, their glory. Such truth, intended as dis-closing, is initiated by the special look of the goddess, of Being itself. Rojcewicz elaborates that Heidegger interprets “the special look” as “the look of Being” (Rojcewicz 2006, 50) which abets the human to respond; so that even if such disclosing is revelatory, it starts from the look of Being, it needs, it calls for the human looking back.

Heidegger's interpretation of the understanding of Being, and thus of the sense of truth in general, of Parmenides and Heraclitus, that is, of pre-Socratic philosophers, as articulated in *Introduction to Metaphysics* reads that “Unconcealment of beings, is not simply presence at hand”, that is to say a mere sensual perceiving of that which is present. He writes that

Unconcealment happens only in so far as it is brought about by the work: the work of the word as poetry, the work of stone in temple and statue, the work of the word as thinking, the work of the *polis* as the site of history that grounds and preserves all this. [‘Work,’ according to what we said earlier, is here always to be understood in the *Greek* sense as *ergon*, as that which comes to presence and which is produced into unconcealment] (IM, 204-205).

For the pre-Socratic Greeks, the meaning of truth is “The striving for the unconcealment

of beings and thus of Being in the work” (IM, 205).

In Heidegger’s interpretation of the ancient Greek experience of truth, of *aletheia*, work is not the active striving of the human relying only and predominantly on its own effort as it is conceived today; but the responsive participation of the human who is called upon to participate, to share in the insight that claims her/him and not viceversa. Being factually in such truth, abiding and dwelling in it, the human can comprehend authentically beings in the work that discloses the truth, the Being of beings. This participatory, actively responsive search for the truth, Heidegger writes, happens also in the constant “strife against concealment, covering-up, against seeming” (IM, 204). In other words, there is also the possibility that Being remains concealed, and all one is left with is mere opinion, hearsay, and a blind going about.

Heidegger reads in the word *phusis* the fundamental Greek experience of Being, in all beings and as a whole. *Phusis* is that which self-emerges out of itself in the multifold of beings, that which holds sway over beings' emergence and constant presence. In view of *phusis* so experienced, the being human is the one who is called upon to bring that which self-emerges into the open, into the light to an intelligible stand, in the encountering in which the human being-itself essentially belonging as a being to *phusis*-who must heroically stand out in Being’s call and through the work, actively participate in the un-concealment, the dis-closing of the truth, which happens “always in the midst of seeming, taking it seriously” (IM, 111), knowing the power of what only seems to be, of semblance and opinion; of what today we call error and mean the non-correspondence of a stated proposition to an objective fact.

In the just specified sense of the truth, of *aletheia* as disclosing, then the ancient

meaning of the Greek word *theoria*, theory, is thus interpreted. The meaning of the word consists of *thea* as the self disclosing of the goddess, or the gods, or of Being, which, again Rojcewicz clarifies are “guises for Being in general, for the essence of beings”, the look of Being, the sway of Being casting its look upon the human; while *horao* refers to the looking back of the human in the understanding of Being produced in the work. As Rojcewicz puts it “Thus to be theoretical, *thea*-horetical, means to have some insight into the gods, to be in the truth, to understand, more or less, the meaning of Being in general” (Rojcewicz, 2006, 7). So that for the pre-Socratic Greeks, the term *theoria* is thus composed of *thea* as the looking of Being, in the unveiling of the truth and *ora* as the human apprehensive looking back, the pious care, in the sense of a “deferential, solicitous looking back” (Ibid., 8).

2.2 Being in the Unity of *Phusis* and *Logos*, of Being and Thought

The Transformation of *Phusis* as Nature and *Logos* as Reason

Within this understanding of the truth, how is, then, knowledge more specifically conceived by the Greeks? Heidegger, in rendering the Greek conception of knowledge, considers the ancient meaning of the word *logos*, within the encompassing experience of Being as *phusis*. What does *logos* signify for ancient Greek Dasein? Heidegger writes that “*logos* is: *the gatheredness of beings themselves*” (IM, 137). And again “*Logos* is constant gathering, the gatheredness of beings that stand in itself, that is, *Being...Phusis* and *logos* are the same. *Logos* characterizes Being in a new and yet old respect: that which is in being, which stands straight and prominently in itself, is gathered in itself and from itself, and hold itself in such gathering” (IM, 138).

Against the current translation of *logos* in the philosophy of Heraclitus and Parmenides, as thinking, understanding, and reason, Heidegger translates the pre-Socratic sense of this word, from the common meaning that the word *logos* had as “gleaning, collecting wood, harvesting grapes, making a selection” (IM, 131); furthermore from a fragment of Heraclitus and within the context of the word signification in other ancient texts, Heidegger retrieves these meanings of *logos* “1) constancy, lasting, is proper to it; 2) it essentially unfolds as the Together in beings, The Together of the being, that which gathers; 3) everything that happens, that is, that comes into Being, stands there in accordance with this constant Together; this is what holds sway” (IM, 135). Here the meaning of gathering is not the putting together of different elements after assessing beings, but it means the “originally gathering gatherness that constantly holds sway in itself” (IM, 135). The gathering does not happen as it can be conceived within a contemporary understanding exclusively by the human being who gathers, the gathering belongs first to *phusis*, so that the gathering happens in and out from the beings that stand as what they are.

“*Phusis* and *Logos* are the same” reads a famous passage of Parmenides, about which Heidegger writes that “*Logos* characterizes Being” in that “that which is in being which stands straight and predominantly in itself, is gathered in itself and from itself, and holds itself in such gathering” (IM, 138-139). In other words, *logos* belongs to *phusis* as the stage when beings come to be as they are in accordance to their Togetherness, the *logos* (IM, 138). The appearance of beings, as what they are, is gathered not first by a human looking, but by the *logos*.

Another famous passage of the pre-Socratic philosopher, Heraclitus, is *pantha*

rhei which is usually translated as “everything flows”. Heidegger points out that this passage does not mean that “everything is mere change that runs on and runs astray, pure inconstancy, but instead it means: the whole of beings in its Being is always thrown from one opposite to the other, thrown over here and over there-Being is the gatheredness of this conflicting unrest” (IM, 142). For Heidegger the overall sense of the fundamental meaning of *logos* for the ancient Greeks is to be understood as “gathering and gatheredness” (IM, 142).

And this gatheredness belongs to *phusis* which holds sway over all beings, over all strife in the manifold of beings. *Logos* belongs together with *phusis* in that “*logos* has the characteristic of pervasive sway, of *phusis*” (IM, 142).

However Heidegger translates *logos*, what is to be clear is that in the original Greek meaning *logos* is not a faculty of the human being either as language or reasonable thought. Eventually, its interpretation as thought and reason happens through the appropriation of Greek philosophy by Scholasticism. In the New Testament, Heidegger writes, *logos* takes the meaning of “one particular being, the Son of God...it means Him as the mediator between God and humanity” (IM, 143). This comes about in that in the Old Testament *logos* is translated as word “in the particular meaning of an order, a commandment...Thus *logos* means...*angelos*, the messenger, the emissary who transmits commandments of God” (IM, 143).

Human understanding as knowledge in the most general sense, as apprehension, is, in the ancient Greek sense, as interpreted by Heidegger, closer to a hearing. Heidegger uses the word hearkening, a hearing that does not only happens through the ears, this hearkening, this hearing then allows one to speak knowledgeably. It is the human

participation, the human itself coming to presence to the gathering, the togetherness of the Being of beings in the *logos* that allows the human to speak the truth. Heidegger writes that “genuine hearkening has nothing to do with the ear and the glib tongue, but instead means obediently following what *logos* is: *the gatheredness of beings themselves*” (IM, 137).

In this regard, Brogan writes that

The same gathering that every proper saying requires is also necessary in order to hear. The gathering of what is heard presupposes also that we are gathered ourselves and attuned to that which is heard, that we belong to it. What is heard is the *logos*, the original gathering together of what lies before us in unconcealment. When we have listened to the *logos* itself, and not merely to what is said about the *logos*, then we let-lie-before, we gather, that which is already there. We let it reveal itself as it is. This is the original meaning of saying. In listening to the *logos*, we say the same, that is, we gather what already lies together” (Brogan 2005, 97).

Heidegger interprets the ancient Greek word for human knowing, *nous*, apprehension, from a statement of Parmenides, with a twofold sense: to apprehend, *noein* means

On the one hand, to take in...to let something come to oneself-namely, what shows itself, what appears. On the other end, to apprehend means to interrogate a witness, to call him to account, and thus to comprehend the state of affairs, to determine and set fast how things are going and how things stand. Apprehension in this double sense denotes a process of letting things come to oneself in which one does not simply take things in, but rather takes up a position to receive what shows itself...*Noein* involves this receptive bringing-to-a-stand of that which appears” (IM, 146-147).

Thus Heidegger interprets that for Parmenides “apprehending that is the same as Being” (IM, 147).

In the appearance of beings, in their manifestation that which holds them together as such beings, *logos*, at the same time intrinsically has the human beings participate, as human beings, in their apprehension, it so commands human beings to be. Heidegger writes that for pre-Socratic Greeks “Being means: standing in the light appearing,

stepping in unconcealment. Where this happens, that is, where Being holds sway, apprehension holds sway too and happens too, as belonging to Being. Apprehension is the receptive bringing-to-a-stand of the constant that shows itself in itself” (IM, 147).

In this sense Heidegger’s interpretation of Parmenides’ verse “Being and Logos are the same”, against the modern translation which translates logos as ‘thinking’ thus placing it within the realm of that which is human, interprets logos as the gatheriness of beings that is accessed by the human in that “Apprehension *belongs to phusis* (Being); the sway of *phusis* shares its sway with apprehension” (IM, 148). Heidegger writes that “Apprehension and what Parmenides’ statement says about it is not a faculty of the human being, who is already defined; instead, apprehension is a happening...in which humanity itself happens... / Apprehension is not a way of behaving that the human being has as a property; to the contrary, apprehension is the happening that has the human being” (IM, 150).

Parmenides, as representative of archaic Greek Dasein, experiences Being as *Phusis and Logos* in such a way that, as Heidegger writes, “Apprehension *belongs to phusis*; the sway of *phusis* shares its sway with apprehension” (IM, 148). Heidegger, in clarifying, writes that

Being holds sway, but because it holds sway and insofar as it holds sway and appears, apprehension *also* necessarily occurs *along with* appearance. But if human beings have a part in the beginning of this appearance and apprehension, then they must themselves be, they must belong to Being. But then the essence and the manner of Being-human can be determined only on the basis of the essence of Being (IM, 148).

Eventually *logos*, experienced by the pre-Socratic Greeks in the originary, unitary relation of *phusis* and *logos*, becomes finally translated, by way of the Latin translation in the meaning given to it by Scholasticism, as “thinking ...in the logical sense as assertion

that analyzes” (IM, 146). This transformation from *logos* as the “togetherness of beings in Being” to which human apprehension belongs also, to *logos* as logical thinking that analyzes nature, with the subsequent division of Being (nature) and thinking, i.e., of the objective and the subjective in the modern sense (IM, 144), for Heidegger this transformed sense of *logos* becomes the “guiding principle of Western philosophy” (IM, 154).

And for Heidegger this guiding principle that guides and dominates all Western philosophy does so because its beginning becomes obscure. Already after Parmenides, according to Heidegger, “the Greeks themselves began to fall away from the truth of the saying” (IM, 154) of Parmenides that “Being and *Logos* are the same”, *logos* gets to be detached from *phusis*, from Being, and it is internalized as the faculty of thinking, which more specifically becomes reason expressed in logical statements, logical discourse. The pre-Socratic experience of *logos* as delimited out of an original identity with Being, is lost, and this opens the way for the subsequent characterization of *logos* as thought, as reason, the human faculty which stands versus Being, that is, versus nature, as the subject versus the object.

From here the various dualities present in Western philosophy of nature versus spirit, nature versus history, nature versus culture; and from here also arises the ambiguity that this word, nature, acquires, in that it can mean nature as all that which is and is not man-made, and it can be used to mean the nature of things, the nature of something, that which defines something as what it is, its core definition, its essence, its defining element, its basic circumscription. Heidegger points out that already in the passage cited that “Logos and Being are the same”, in the explicit saying of their unity, there lies the

possible beginning of their separation (IM, 144).

In this transformation, from *logos* as belonging to the sway of *phusis*, as the *gatheredness of beings*, to *logos* as the capacity for logical statements, as the property of the animal who possesses reason, lies the radical transposition of the being and the role of the human being from Grecian to modern times. In this sense happens the change of meaning of the truth, first intended as an active receptivity of the un-concealment of Being to which the human is called upon to participate in the work in stone, in words, that is, in the bringing forth of the work that dis-closes the truth; to the truth intended as a predominantly positive correspondence of the mental representations of the human to the workings of the natural and social world, that is, produced by the elaborations of human intellectual understanding through personal efforts alone.

This event, to which we have become oblivious, is, for Heidegger, the fundamental event of Western history; it is the fundamental historical transition which pervades and sustains our era, the epoch of metaphysics, of humanism, of modern science and technology, in the rise of the human being as the holder of reason, of logic by which the being human becomes the active pursuer of knowledge. And *phusis*, originally, that which holds sway, translated as nature, becomes that which the human understanding defines it to be, in human representing. The human subject defines what Being is (IM, 145).

In the modern fundamental approach to Being, thought takes up the primal position over and against Being. Being becomes that which is to be delineated in the projections of human thinking, Being becomes delineated by rational thought in the objectivity of all objects, to be accounted for in the formulations of science. Thus the

modern technological, unrelenting domination over nature is directly the result of such an event, as it is attempted to be demonstrated below in Heidegger's elucidation of the basic philosophical positions of Descartes, Kant, and Nietzsche.

Thus for Heidegger after the great Greek beginning, that is, from the post-Socratic on, from the inception of metaphysics in classical Greece, history is, as Rojcewicz puts it, “a 'falling away' from the great original outlook” (Rojcewicz 2006, 3) of the sway of *phusis*, of Being, and a forswearing of the attitude that experiences the truth as the disclosing of the truth of Being in the work; the work is the responsive looking back of the human being to the first look of Being, that to which the human being itself belongs to. So that, as Rojcewicz writes, “the entirety of the intervening history basically amounts to...apostasy (P, 79/54). For Heidegger this apostasy has culminated in metaphysics, humanism, and modern technology” which “are merely different expressions of the same human chauvinism” an “idolizing of humanity” (Rojcewicz 2006, 3).

2.3 From the Pre-Socratics to the Philosophy of Plato and Aristotle as the Inception for All Metaphysics

Heidegger traces the foundational event of Western metaphysics, which will inform all the subsequent Western interpretations of Being, to Plato's and Aristotle's interpretation of Being, in the transformations of archaic Greek philosophy operated by these two philosophers.

Plato and Aristotle are the juncture between the archaic Greek conception of Being, and the beginning of the Greek philosophy which will happen to provide the foundation of Western culture, via its reinterpretation, i.e., its reductive absorption into

Roman culture, which is later taken up by the Church which carries its interpretative appropriation of Greek philosophy, up to the beginning of modern metaphysics and science. Out of this appropriation, and against it, modern metaphysics and science emerge.

Heidegger contends that this transformation, articulated in the works of Plato and Aristotle, of the pre-Socratic approach to Being as *phusis*, is not a clear-cut break with the earlier Greek approach, but both a fulfillment of Greek philosophy and a transformation. On the one hand, it still resonates with what is truly Greek, namely conceiving Being as *phusis*, as that which emerges out of itself and endures in its presence, the appearing of all beings in Being, and to which the human being also belongs to in apprehending that which is present.

On the other hand, the way in which the presence of beings and thus human apprehension are experienced changes, and in this change Heidegger reads the inception of the interpretation of Being that comes to predominance throughout all Western metaphysics in its basic approaches to the question of Being, that is, it lays the foundation for the advent of the modern interpretation of Being that we are.

This transformative event is traced by Heidegger in the change of the fundamental conception of Being as *phusis*, the self-emerging power that endures in the constancy of beings' appearing, their presence. Presence, this is also named by the ancient Greek word *ousia*, which refers to the constancy of that which emerges-out-of-itself and thus presences in and as the manifold of beings which only then, as appearing, as presence offer an aspect, a look, in Greek *eidos*, to human viewing and appraisal.

In the interpretation of Being as presence, experienced in the word *ousia*, that

Heidegger traces the inception of the beginning of metaphysics. *Ousia* means the presence of beings, both as the presence of beings that emerge out of themselves, *phusis*, and their holding as themselves in the togetherness of *logos*, the enduring of beings' presence in appearance. In this appearing, beings open themselves to be known, that is, they offer a view of themselves. In the basic fact that in their appearing they come to be, in this most fundamental fact that they are, that they appear and endure, they offer an aspect in which they appear, a look, the look of what they are.

Heidegger explains that consistent with the overall interpretation of the ancient meaning of *phusis* as the “self-emerging-out-of-itself”, the first look is attributed to the emerging presence of any entity. Any being in emerging “creates space for itself” (IM, 195), as the ancient Greeks did not have the modern sense of space where a thing is located according to any set of coordinates or references. Out of making its own space, its own place, then, any being appears, it presents itself out of itself, it appears in the look of itself to the view of the human, who then can apprehend the what and how of any being that show itself from and in its look, its *eidos*. So the look belongs, as Heidegger puts it, to “the available coming to presence of what comes to presence: *ousia...Ousia*, then can mean both the coming to presence of something that comes to presence *and* that which comes to presence in the whatness of its look” (IM, 193).

This indicates that *ousia* as presence can be understood in that something appears at all out of itself, and, secondarily, in this appearing offers a look of what it is, which is available to the human taking-in, to apprehension. Heidegger provides this example, that if one says “After the bend on the path, the mountain range appeared in the distance”, this would, in a Greek sense, mean that the mountains presented themselves to the look of the

traveler, not that the traveler seized their view, as we would understand it today.

Heidegger writes that “The look of a thing is that within which, as we say, it presents itself to us, re-presents itself and as such stands before us; the look is that within which and as which the thing comes-to-presence—that is, in the Greek sense, *is*” (IM, 192).

Being as *ousia* means that a being emerges-out-of-itself, it comes to a stand for itself first, a being “that it is”, and in so doing it offers a look, that is, the look of “what it is”.

Heidegger clarifies that

if we understand the *idea* (the look) as *coming to presence*, then coming to presence shows itself as constancy in a double sense. On the one hand, the look entails the standing-forth-from-unconcealment, the simple *estin* (is). On the other end, what shows itself in the look is that which looks that way, *what* stands there, the *ti estin* (what-it-is)...*What* any given being is consists in its look, and the look, in turn, presents the being’s whatness (allows it to *come to presence*) (IM, 193).

In other words, the coming-to-presence of any being is conceived in this twofold way: 1. in that a being emerges out of itself, it appears at all and thus is, that-it-is; 2. And in that it is, it show itself as what-it-is, in the look of what it is. In the unification of these two moments, the presence of beings, i.e, the Being of beings, becomes available to human apprehension. This, according to Heidegger, is still consistent with the “fact that Being is experienced as *phusis*, as emerging sway, as appearing, as standing-in-the-light. What else does what appears show in appearing if not its look, the *idea*?” (IM, 194). Here Heidegger locates the very beginning of the modern understanding of Being as conjured in the ideas of the human being as will be articulated below.

2.4 The Understanding of Being for Aristotle: the Motion of the Being in the Unity of Form and Matter

With Aristotle the Greek conception of Being as *phusis*, the emergent out of itself, and thus standing in the multifold of beings, is experienced as *ousia*, that is, as presence, and this presence is conceived as the presence that endures in the constant becoming and succession of beings, their constant motion in Being. The presence of beings, *ousia*, is for Aristotle first possible in their motion into Being. This happens in the coming together of thatness and whatness. In other words, in that a being is (that it is) it must make its own space, its matter must be there, at the same time the matter includes its form, what a being is (what it is).

For Aristotle, the Being of beings, for the presence of each specific being to a human knowing, these two moments have to both be available. That-ness and what-ness constitute the Being of beings. This originary point of access to the Being of beings is their motion, not intended from place to place, locomotion, or as growth, as an adding up, but in the basic way in which beings come to presence, and so are, what they are. The movedness of all beings is the *kinesis*, the movement of the coming to be of beings, which happens in the coming together, of that-ness and what-ness, of matter and form, of *hule* and *morphe*.

The *morphe*, the form, is the boundary of each being, the form is the limit that delimits the place that each being has created for itself, in its matter, in order to be; this primordial movement belongs to all the manifold of natural beings. The movement of beings in Being is of their matter and form, always toward that which each being is in itself, the limit of its form, e.g., the form of alder tree for each alder tree, that is, its *telos*. *Telos* then does not mean purpose or end, but can be more closely translated as

fulfillment, the fulfillment of each being as to what it is, in presence, in unconcealment, in Being.

Each being is the coming together of matter and form, and in its becoming each being moves constantly toward what it is, that is, toward the limit of the *eidos*-the form of what it is, the *telos*-the boundary of the form, in the sense of the fulfillment in presence of its inherent potentiality as to what it is from the beginning: the seed of the tree moves toward becoming the mature tree, so that it is from its beginning already toward its fulfillment in the form of the tree that it will become and is.

Ousia, presence, happens in the material coming to be of the specific form, its emerging and unfolding toward its fulfillment in what it is.

Aristotle understands Being, *phusis* as *ousia*, as the permanency of presence, the constant presence of beings. Furthermore, the Being of beings is fundamentally constituted by beings' becoming toward their potentiality inherent in themselves, the *telos*, the fulfillment of the unity of their matter and form, to its final form, the *telos*. A process that constantly keeps recurring.

For Aristotle, *eidos* (what any entity is), the form, cannot be without *hule*, the material, the substance, so their togetherness allows beings to be. Each individual being that is, is in its becoming toward what the entity already is, the *eidos*, the form, as the seed of a specific tree, will become *that* specific tree and reproduce, thus returning. The *eidos* is that which each being is-always-toward from the beginning, and which unifies each entity with all that is of the same kind; the material is how the being makes its own space so is, thus can make contact, contrast, resist, that is, relate to other beings. The whole of the form and matter in each being is Being as presence.

The coming in Being of beings in matter and form, in *hule* and *morphe*, constitutes from within beings themselves, the presence of each and every natural being. The motion of the material and the form toward the fulfillment of each being in the manifestation of what it is, of the form, which is not somewhere else but in the entity itself as a “this one”, a specific being, thus is the presence of beings constituted, so that they can appear to us and be known by us. From such a first insight regarding their being and becoming, from such a basic insight regarding the fundamental motion of any being into and as Being can knowledge proper proceed.

For Aristotle form and matter, *eidōs* and *hulē*, are intrinsically constitutive of the Being of any being. Brogan, in this regard, clarifies that “*Hulē* and *morphe* are not 'in' beings so that they could ever be separated out (as if they were non-essential properties). Rather, together they constitute the being of a particular being. 'But as has been said, the closest matter and the shape are one and the same' (*Met.* 1045 b17–18). They are the twofold *archē* that directs and governs over the emerging of natural beings” (Brogan 2006, 90).

Brogan further points out that for Aristotle matter and form “are the twofold *archē* that directs and governs over the emerging of natural beings. At the same time, they are this emerging-forth itself from out of itself toward itself while remaining always in itself that is the way of being of natural beings” (Brogan, 2006, 90).

What is later translated as material (*hulē*) formal (*morphe*) and final (*telos*) cause, pertains with the inner motion of beings themselves in Being, these intrinsic aspects of the Being of beings, Heidegger translates more in congruence with Aristotle's sense, as that which is co-responsible for the Being of beings, that any natural scientists has to

know at all if she is then capable to study them.

Aristotle is concerned with the starting point of any knowledge, that is, regarding the Being of beings; this is understood as the movement, the *kinesis*, of beings to their presence, their emergence and becoming in presence: in that they are and in what they are. Brogan writes that “Aristotle takes the ordinary experience of natural beings as moved beings and asks what their being must be if they show themselves in this way” (Brogan 2006, 29). Aristotle asks for the cause of beings in their motion to manifestation, in that they are born, endure, develop, reproduce and die. And, as Brogan points out “Heidegger suggests that cause here means: 'what is responsible for the fact that the being is *that* being that it is” (Brogan 2006, 31).

What Aristotle questions is the origin of the motion of beings in Being, which happens in the manifestation of each being as the whole of form and matter, which belongs to beings themselves. This not a cause as from the outside. It is this whole that allows, is responsible for each being to be the being that it is. In is the unity in each being of form, matter, and fulfillment that is responsible for the presence of beings, for their being moved, and thus for their Being.

It is in such a foundational sense that Aristotle experiences the priority of motion, of *kinesis*, as the coming to presence, to Being, of any being. Brogan writes that for Aristotle “This characteristic of being-moved is the presupposition on which all investigation of science is founded. Aristotle says: 'Scientific knowledge through demonstration is impossible unless one already knows the first, immediate starting points” (Brogan 2006, 29). For Aristotle Being is *ousia*, which means not substance, as it is usually translated, a translation taken from the Scholastics, nor actuality as translated

by the Romans, but presence, the constant presence of beings, which is now experienced in the togetherness of the manifestation of the primordial movement of the reciprocal unity of form and matter.

The understanding of Being that Aristotle experiences is not understood as the representational thinking of the subject, as modern metaphysics fundamentally grounds knowledge; for Heidegger contends, Aristotle does not think a “doctrine of causes” that is applicable to beings. The understanding of Being that Aristotle experiences happens in the unconcealment of beings in Being, in the unitary coexistence of form and matter in any being, which is available to a human knowing, so that one can know the tree there, the grassy knoll, the mountain, the clouds, the goats, the sea.

Scientific knowledge can then be pursued in demonstration, based upon such fundamental knowledge of the Being of beings. The understanding of Being of ancient Greek Dasein as articulated by Aristotle is not the human representational capacity, but the unconcealment of beings in their self showing presence. It is from this “self showing”, to which the human being participates, that knowledge is gathered, knowledge is gathered in the self disclosing of the Being of beings.

According to Heidegger, for the Greeks any phenomenon is not understood by the human sizing upon such appearing, Heidegger interprets that “*Phainomenon* means the self-showing, what is manifest” (Brogan 2006, 29). The basic knowledge that is always already happening in the human to know and thus recognize any being at all is based upon the self showing of beings, that they appear, make themselves manifest, in their original (genesis) motion in Being. For Aristotle the “characteristic of being-moved is the presupposition on which all investigation of science is founded” (Brogan 2006, 29).

The presupposition of any knowledge of beings is the presence of beings as the movement in the manifold of beings, of matter and form, the constitutive whole of each specific being. In this regard, Brogan writes that “For Aristotle, the question of Being is the question of what makes a particular being the being that it is. 'What we are seeking is the cause (that is, the *eidos*) of the *hule* (by which the being appears) as something, (the vision of the whole, of the *arche* that governs beings and makes seeing possible.”) This is the *ousia* of the being’ (*Met.* 1041 b7-8)” (Brogan 2006, 89). This is how Aristotle experiences the Being of beings.

Aristotle is here articulating that knowledge that must already be there for the human being to know anything at all. In other words, knowledge happens in the human seeing, that is, the understanding of the unity of form and matter of each being, in the physical presence of each specific being, in the sheer indicative perception of a specific being. *Ousia* the presence of beings comes to a disclosing in the human vision of the whole of the *arche*, that is, the unitary appearance of form and matter of each specific being.

Specific knowledge of beings, what Heidegger calls ontic knowledge, can proceed only when ontological knowledge is made clear, and guides all scientific proceedings and demonstrations. Aristotle thinks in the same way, as quoted before, Brogan writes that “Aristotle says: 'Scientific knowledge through demonstration is impossible unless one already knows the first, immediate starting points.' *Aisthesis* presupposes the vision of the whole, of the *arche* that governs beings and makes seeing possible. 'It is *nous* that apprehends the *arche*’” (Brogan 2006, 29). That is to say that *aisthesis*, the perception of *this* being intrinsically involves the partaking, the seeing of the whole, the unity of form

and matter, intrinsic to beings' presence.

In other words, the seeing (understanding) of the unity of form and matter of each tree, that permits the perception of the presence of each specific tree. To know for Aristotle is in Heidegger' interpretation "the ability to hold together the seeing (*nous*) of the whole and the seeing (*aisthesis*) of the individual that is constituted by this whole. It is because human being is the site of this correlation that we can see beings in their being and understand the being of beings" (Brogan 2006, 27).

That is to say that, for Aristotle in the coming together of the seeing, that is, the knowing of the whole of matter and form, in the perception of each being, that the Being of beings unconceals to a human knowing, so that beings come to stand in human knowledge. Thus Brogan writes Aristotle says "when we point to a particular being and say, '*there is phusis,*' we do so with truth" (Brogan 2006, 94).

Brogan, in clarifying how Heidegger interprets Aristotle, writes that

To understand a being in its being, we need to perceive the being not merely in the particular way it shows itself at a given time; we need also and in advance to see the being by looking beyond the being to the horizon out of which and toward which the being is. This is the *arche* and *phusis* of the being. We then stand in relation to the being of this being. Aristotle speaks of this relation as a way of addressing beings (in their being). It is not simply a grasping (*noein*) of the *eidōs* that is involved, but a grasping of the *eidōs* through *logos*. It is through *logos* that we see the being in terms of its *eidōs* and we see the *eidōs* as that which constitutes the being as a being. We have already seen that *morphe* has a certain priority in the structure of *phusis* and that Aristotle thinks *morphe* as *eidōs*, the way a being shows itself to us in advance in its being. But, even here, Aristotle does not say *eidōs* is the meaning of being but *eidōs to kata ton logon* (*Physics* 193 b2). As Heidegger points out, '*eidōs* is understood essentially as *eidōs* only when it shows itself in the horizon of an immediate address of beings' (WBP 345). For Aristotle, the *eidōs* is always the *eidōs* of a being. Thus, the human being cannot attain a relationship to being by abandoning his relation to beings" (Brogan 2006, 95).

In other words, Heidegger interprets that for Aristotle, in the knowledge of the Being of beings, as the unity of matter and form, the *morphe*, *eidōs*, the form, what something is, bears a certain priority in such a basic knowing; but *eidōs*, the form is never

in itself separable from the matter, indeed form always happens in “an immediate address of beings” of each and every specific being, this tree, this mountain, this river, available to sensual perception and recognition.

Heidegger articulates that if Aristotle stands in the ancient Greek understanding of Being in which the knowledge of the Being of beings happens from the unconcealment of Being to which the human as human participates, that is, the truth for Aristotle happens in the attunement of the human being to the presence of beings, as articulated above. Yet with Aristotle a shift begins which eventually leads to the modern understanding of Being in which the truth of beings resides in the correctness of the human representations asserted in propositions, still of course in view of beings' presence, but ultimately grounded in representing, in a human production.

Brogan writes that for Aristotle, in Heidegger's interpretation,

Our relation to beings *and* being is called *logos*. If our *logos* fails to be a standing in a proper relation to being and beings, then our interpretation of natural beings and of *phusis* itself will fall short of the truth. The way of *logos* is not a logic or formal system of language that we place between ourselves and beings in order to interpret beings through language. Rather, language itself is the deposit and formalization of the discoveries about beings and being that the original relationship of humans and beings makes evident. Divorced from this primary meaning, language loses its force and falls out of its element (WBP 350) (Brogan 2006, 95).

For Aristotle *logos* is to be directed by the *eidos* that belongs to beings, only by partaking of the *eidos* of beings can *logos* bring to language the way to characterize beings first in the truth of their presence, the unity of form and matter, and then in the many changing respects in which they are present to us. *Logos* in addressing the presence of each being, indicated in such addressing as in the simple recognition of saying “there is the tree” opens the way for any other saying regarding that tree.

As Brogan puts it “It is in the *logos* of assertion that the disclosure of a natural

being as having this or that characteristic takes place. This disclosure first of all takes the form of addressing the being as something, a making specific and thematic what the being is and keeping it in this disclosure” (Brogan 2006, 184). In other words, the first disclosure of the Being of beings happens in the identification of a being, as the being that it is, a tree, a ship, a mountain, so that any other knowledge can be spoken of regarding that tree, that ship, that mountain.

According to Aristotle, as interpreted by Heidegger, in order to apprehend beings as they are encountered in their presence, their being, the *eidōs*, what they are, has to be known through the *nōus*, which modern metaphysics calls the understanding, in advance, and this “foregrasping is rather a way of understanding the being of beings in which human beings always dwell, and thus it makes possible for humans to interpret beings. This dwelling in an understanding relation to being is what Aristotle calls *noein*, the seeing of the *archē* and *eidōs* of beings” (Brogan 2006, 100).

This participatory understanding in the *eidōs* of beings, allows the Being of beings to come to an unconcealment in human recognition, in the human knowing of that being as something, as that house, as that tree, as that hill; this unconcealment of the truth, *alētheia*, of what each being is, is then the basis upon which, *logos*, discursive thinking can speak of and assess the characteristic of each specific being, and their relations to each other, that is, one can say “that house is large, white, well ventilated, and out of the way”.

Brogan writes in this regard that “Aletheia, truth, belongs to being” (Brogan 2006, 187), in other words, the truth belongs to Being in that, in the appearing of beings in what they are, the source of beings, the *archai*, form and matter, in their motion of coming forward into presence and enduring in it, their *genesis* out of no-being into Being belongs

to the beings themselves, the presence of each being reveals itself to the human *psuche* (soul, understanding, thought); thus Brogan writes “the human being stands essentially in relation to the twofold character of being. This prior disclosure, this oneness of 'seeing' and being, is the basis for the logos of assertion and propositional logic. In *Sein und Zeit*, Heidegger analyzes in detail the derivative character of the truth of assertion and the primordial meaning of truth as unconcealment” (Brogan 2006, 187).

For Aristotle *ousia* is the presence of each individual being itself, whose presence is accessed in apprehending the unity of its matter and form, by the seeing, the *noein* of the *arche* (guiding principle) in the unity of *eidos* and *hule* of each being in their presence, their appearing to us as to what they are. When the seeing, the understanding grasps this unity, then a specific being is known to us, the Being of that being, or of any other being is thus known to us, at the most basic and general sense of knowing, a knowing in which we constantly are and dwell. Out of this basic knowing of what, each being that is, is, one can assess and say how big it is, where it is, in what relations is to other beings, etc..

For Aristotle, as interpreted by Heidegger, the being as presence happens in the motions of beings, in the coming together in each being of its form and matter, the seeing of such unity, this is the pre-grasping that happens for any knowledge of any being. This pertains to the study of the Being of beings, of metaphysics. The presence of beings so disclosed then offers many different respects in which the human can know of beings, one can then speak of beings in view of these respects, these categories which include quantity, quality, location, time, relation to, etc., one can discourse about beings in the respects in which they are.

Brogan writes that

Aristotle was the first to think out the categories (quantity, quality, relation, etc.) as the basis of our ordinary ways of addressing beings. Thus, the philosophical categories were discovered by Aristotle by meditating on the meaning of *ousia* in its everyday usage. In the passage from *Physics* B1 that Heidegger analyzes, the word category is in fact used in this ordinary sense of 'address.' In our dealings with beings, we address them as what they are—as a bed or robe, and so on. It is this naming that lets a being appear in a context of meaning and brings the being into public view as being such and such. Thus, for example, when we address a being as a door or say that a door is large, we point out something and let what we are talking about be seen in a certain way. Heidegger suggests that this meaning of category can be grasped by looking at the literal sense of the Greek word *kata-agoreuein*. *Agoreuein* means to speak in public, to announce something publicly, to bring something into the open. *Kata* means something on high regard to something below; it means the view toward something. Thus *katagorein* means to reveal and make public something by regarding it expressly as what it is (Brogan 2006, 43).

Eventually the categories become the foundational concepts that articulate in the propositional assertions of language, of human thought the Being of beings. As will be articulated below, Kant qualifies four fundamental categories of the pure understanding of the transcendental philosophy; Nietzsche suddenly calls the categories, values.

Thus with Aristotle language begins to shift toward becoming the site where the human relates to beings, *logos* as discursive thought, moves toward belonging to the human being, it is no more the *logos* that belongs to *phusis*, to Being of earlier Greeks; *logos* as reason as discursive logic now belongs to the human being in such a fundamental way that, as Brogan puts it, it is not “an attribute of the human being. Rather *logos* defines the human being and sets him or her apart as human” (Brogan 2006, 96).

It is here that Heidegger traces the moment when, from Aristotle on, the *logos* that for pre-Socratic philosophers belonged to the Being of beings, to *phusis*, begins to shift to being understood as the asserting of reason, of the logical propositions of the human. Yet as Brogan puts it, for Aristotle, “The way of *logos* is not a logic or formal system of language that we place between ourselves and beings in order to interpret beings through

language. Rather, language itself is the deposit and formalization of the discoveries about beings and being that the original relationship of humans and beings makes evident” (Brogan 2006, 95).

Yet for Heidegger this becomes precursory of *logos* understood as human reason, as logical discourse, as rational thought spoken regarding that which is and in so doing defining the Being of beings. That is, *logos* as reason comes to stand versus and underling Being, and comes to belong essentially and exclusively to the one who speaks rationally, the human being, the subject standing versus what is objective of nature, in all the object-domains of science.

2.5 Plato's Understanding of Being in the Priority of *Eidos*, of Idea, as the Precursor of Being as Idea of Modern Metaphysics

On the other hand, for Heidegger, Plato experiences the Being of beings in the primacy of *eidos*; that is he emphasizes *eidos*, the form over matter, which Heidegger interprets as beginning the fundamental “transformation of Being from *phusis* to *idea*” (IM, 198) which brings about the new understanding of Being that holds sway over all subsequent metaphysics.

Heidegger articulates that this shift occurs in that Plato gives a new, extended meaning to the word *eidos*, he writes that

The word *idea* means what is seen in the visible, the view that something offers. What is offered is the current look or *eidos* of whatever we encounter. The look of a thing is that within which, as we say, it presents itself to us, re-presents itself and as such stands before us; the look of a thing is that within which and as which the thing comes-to-presence-that is, in the Greek sense, *is*. This standing is the constancy of what has come forth of itself, the constancy of *phusis*. But this standing-there of the constant is also, from the human point of view, the foreground of what comes to presence *of itself*, the apprehensible. In the look, that which is, stands there in its whatness and howness” (IM,

192).

In other words, the look that beings in their being offer comes from the beings themselves, it belongs to them, as the Greek understood Being as *phusis*, as that which emerges out of itself, natural beings, and thus offer a look, what they are, to the human encounter.

Heidegger contends that what changes with Plato is that *eidōs*, the form, which first is just a consequence of the conception of Being as *phusis*, i.e., any being that emerges out of itself as the being “that it is”, then offers the look of “what it is”, the look which is the consequence of the emerging of beings themselves, takes a predominant role, that is, becomes Being itself. Heidegger writes that *eidōs*-idea “rises up as the sole and definitive interpretation of Being” (IM, 194).

Heidegger elaborates that in Plato’s meaning of *idea*,

idea and *eidōs* are used in the extended sense, meaning not only what we can see with our physical eyes, but everything that can be apprehended...as soon as the essence of Being comes to consist in whatness (*idea*), then whatness, as *the* Being of beings, is also what is most in being about beings...On the one hand, whatness is now what *really* is, *ontos on*. Being as *idea* is now promoted to the status of what really is, and beings themselves, which previously held sway, sink to the level of what Plato calls *me on*-that which really should not be and *really is* not either-because beings always deform the idea, the pure look, by actualizing it, insofar as they incorporate into matter. On the other hand, the *idea* becomes the *paradeigma*, the model. At the same time, the idea necessarily becomes the ideal...The *chorismos* has been ripped open, the cleft between the idea as what really is, the prototype and archetype, and what really is not, the imitation and likeness” (IM, 196-197).

Here Heidegger traces the beginning of the change of the meaning of truth in general from ancient Greek times to modern times. The older sense of truth happens from the appearing of beings in the participating of the human to their disclosing as to the fact they are at all, and what and how they are, begins to transform toward becoming the correspondence of the propositions of human representing to state of affairs, the standing

of any phenomena in its truth is essentially related to a human representing. In this sense, for Heidegger, the power that appearing, the simple being there of beings loses its sway, it becomes the mere, always somewhat deficient, instantiation of an idea, of the paradigm, of the model, of the prototype.

Heidegger writes that “Now appearing takes on still another sense on the basis of idea. That which appears, appearance, is no longer *phusis*, the emerging sway, nor the self-showing of the look, but instead it is the surfacing of the likeness. In as much as the likeness never reaches its prototype, what appears is *mere* appearance, really a seeming, which now means a defect. Now *on* and *phainomenon* (what is and what appears) are disjoined” (IM, 196-197). Thus today the word appearing also contains a sense that appearances denotes a pretending, a semblance. And indeed at the beginning of modern metaphysics and science, straightforward sensual perception becomes secondary, even if without it no world would be available for any science.

In this change then, Heidegger writes that the “truth of *phusis-aletheia* as the unconcealment that essentially unfolds in the emerging sway, now becomes...resemblance...the correctness of seeing, the correctness of apprehending as representing” (IM, 197). The corrected vision is the one that grasps that which appears in view of its own definition, its idea, the model, the paradigm, which becomes true Being. Heidegger writes that “Because the *idea* is what really is, and the *idea* is the prototype, all opening up of beings must be directed toward equaling the prototype, resembling the archetype, directing itself according to the idea” (IM, 197).

Here, then, for Heidegger, emerges the modern sense of truth in which the beings have to respond to the first look of the human being, his ideas, his hypothesis, as will be

articulated in more detail below. In other words, here begins the modern sense of knowledge grounded in human representing as foundational for modern science.

When Plato raises the look that beings offers, the whatness, as the Eternal Forms, as that which is true Being, then, for Heidegger, this conception opens the way to an interpretation of Being where a divide opens between the appearances of beings, their presence, their look, and the human looking that can conceive what they are in the purity of conception, in the model that allows the look of each being to be recognized and known. So that the whatness, the ideas, the Eternal Forms become true Being while the appearances only copies, shadows. In such a divide the Church would later establish its own doctrine of Being in the separation and dominion of the one Creator, up above and over all beings that are, as created, down below.

Heidegger writes that with Plato “Being as *idea* was elevated to a supersensory realm. The chasm...is torn open between the merely apparent beings here below and the real Being somewhere up there” (IM, 111). In such a chasm, Christian doctrine eventually establishes itself, Heidegger writes “reinterpreting the Below as the created and the Above as the Creator” (IM, 111). This is why Nietzsche would call Christianity, Platonism for the people.

2.6 The Philosophies of Plato and Aristotle as the Commencing of Modern Metaphysics

Plato and Aristotle mark for Heidegger the beginning of the end of the Greek understanding of Being as *phusis* and *logos* in their belonging together, and the rise of the

modern determination of *logos* as the assertive logic and *phusis*, Being, as human representing, as the ideas of the human subject.

Plato's new interpretation of Being in the priority of the idea, the model, and Aristotle's interpretation of *logos* as the assertion are, for Heidegger, the fulfillment of ancient Greek philosophy, and at the same time, the beginning of a transformation: the unity, the "belonging-together" of *phusis* and *logos* breaks up and so does the sway of *phusis* over the being that is human, who rises up to become the holder of the ideas that determines the fundamental categories, articulated in language, of Being, of nature. *Phusis* is on its way to become physics, the fundamental propositions and formulations of the models about nature held to be true by modern physics, by modern science, as will be articulated below.

The Being of beings is now assessed according to the ideas, the categories that define beings as to what they are. Beings are on their way to be conceived in their ontological standing as the objects that are to be conceived and systematized according to the fundamental ideas, that is, in view of the concepts regarding their beingness, their being represented in the ontological thought of the subject. Truth now becomes the correctness of *logos*, that is, of thought; truth must be an undistorted view of beings according to what is most true about beings, the ideas which define what beings are.

What is decisive is that the original definition of the truth of beings which unconceals itself in the *logos*, which fundamentally belongs to Being, to *phusis*, and holds sway over human apprehension too, now begins to shift from the realm of Being itself, that which is overwhelming and holds sway, the belonging together of *phusis* and *logos*, toward the human realm, toward the thinking capacity of the human being. That is

why Cicero said that the turn happening around the time of Socrates, Plato and Aristotle, “called philosophy down from the heavens and relegated it to the cities of men and women” (Rojcewicz 2006, 1).

The overwhelming, commanding, cohesive power of *phusis*, of Being, in all that is, the gods included, begins to fade, according to Heidegger, right with and after Plato and Aristotle. The Being of beings begins the shift toward being experienced as the material world already there for the objective grasping view of the subject, the animal who has language and reason. For Heidegger, the end of Classical Greek philosophy is the inception of the ethos that will come to characterize modern Western culture, manifested in modern metaphysics and science.

For Heidegger, the Greek classical period sustains all subsequent philosophical discourse in the West. Yet the knowledge of beings as beings for Aristotle and Plato is still prompted from the Being of beings (which Aristotle experiences as the unity of form and matter, and Plato as the instantiating of the eternal forms into matter) to which the human being participates in their disclosure in knowledge, so that the human being can then speak of them knowledgeably.

The ground of knowledge moves toward belonging to the human being who becomes the one who defines the Being of beings in fundamental concepts, in fundamental propositions, so that anything truthful to be said about beings is to be assessed from such basic concepts, still in view of the beings of which we are speaking, but back from the statements in which one asserts what is true regarding beings, that is, regarding their nature. That is, the truth stops happening, as for the archaic Greeks, in the hearing of the *logos*, as that which gathers the human being itself, now the gathering

happens in *logos* as the asserting of language, as discursive logic. Language ascendancy over Being begins with Plato and Aristotle.

When Being (*phusis*) becomes interpreted as idea, then human apprehension, which belonged to *logos*, is on its way to appropriate *logos* as reason. *Logos*, the self-gathering of beings in their togetherness, gets detached from its essential belonging to *phusis*, to Being; now *logos* as reason, and Being as the idea, the paradigm, the model are what is mostly true about the Being of beings, the propositions of reason, the representing of reality. Plato's conceiving of the predominance of the ideas as what is most true about beings coupled with Aristotle emphasis on the assertion, expressing in propositions that which is most true about beings, for Heidegger, open the way for the later modern understanding of Being.

Starting with Aristotle, *logos* as assertion moves in the direction of becoming the residence regarding what is true or false about beings. And thus here lies the beginning of the predominance that language acquires in the definition, acquisition and transmission of knowledge proper. Heidegger writes that "Language, as what is spoken out and said, and as what can be said again, preserves in each case the being that is opened up. What has been said can be said again and passed on" (IM, 198). In other words the assertion becomes the locus where truth is preserved in such a way that the being that was originally opened up in the gathering of *logos*, brought to knowledge in asserting, is not itself in need to be experienced in each particular case, but knowledge can be passed on by referring back to the assertion only.

Heidegger explicates that language preserves the truth, truth which can be taught, and so passed on. In teaching, in this passing on of the truth of beings, reference to

beings, the pointing to them, can then be waived. In this way, eventually language takes up a predominant position regarding the knowledge of beings, that is, what is true or false about beings is referenced back to itself.

Thus Heidegger writes that “truth loosens itself, as if it were, from beings...Logos in the sense of saying and asserting, now becomes the domain and place where decisions are made about the truth—that is, originally, about the unconcealment of beings and thus about the Being of beings” (IM, 198).

The truth of beings experienced as the *logos* that gathered beings in Being, to which the human itself was gathered in apprehension, in the participation to the unconcealment of the Being of beings, begins to fade. Now the gathering (knowledge) of the Being of beings still happens in the *logos*, but now the *logos* is on its way to become the logic assertions of reason, as the foundation upon which any truth is to be based. In other words, as Heidegger puts it, “*Logos* and *phusis* disjoin, step apart from each other” (IM, 190); that is, “*logos* secedes and then begins to establish the dominance of reason” (IM, 191).

In other words, for the archaic Greeks, at the inception of Greek philosophy, truth happens in the hearing of the *logos*, unconcealing the truth about beings to the human being, so that one could then speak truthfully, in participating in such unconcealing in the work. Heidegger writes that

In the inception, *logos* as gathering *is* the happening of unconcealment; *logos* is grounded in unconcealment and is in service to it...But now, *logos* as assertion becomes the locus of truth in the sense of correctness. We arrive at Aristotle's proposition according to which *logos* as assertion is what can be true or false. Truth, which was originally, as unconcealment, a happening of the beings themselves that held sway, and was governed by means of gathering, now becomes a property of *logos*. In becoming a property of assertion, truth does not just shift its place; it changes its essence. From the point of view of the assertion, the true is attained when the assertion directs itself according to beings.

Truth becomes the correctness of logos (IM, 199).

Logos is no more the *gathering of* beings themselves in their Being, but in that *logos* becomes the assertion, what can be said about beings; it now comes to mean to say “something about something” (IM, 199). The truth happens in the assertion that says “something about something” in analyzing what something is, and thus this can be correct or incorrect. The ancient Greek sense of truth as the unconcealment of beings, which moved from beings themselves, had its opposite in *pseudo*, the distortion, the twisting, the covering up of unconcealment, of *a-letheia*, of dis-closing, and this distorting still happened from beings. With the new sense of truth as the correctness of the assertion, the opposite of truth is the un-correct, that is, the falsity, which is not from beings but from the appraising view of the assertion (IM, 205). The truth or the falsity still happens in view of beings, but they essentially take place in the realm of human thought and appraisal.

Knowledge moves from being experienced as the unconcealment of the Being of beings to which the human is called to participate in responding to that which is shining, that which is glorious in the look, unconcealing itself to the responsive seeing of the human: preserving the revealing of Being, in the work, in *poesis*, in poetry of words or stone; now knowledge moves toward becoming the correctness of the view, the view the human holds in its ideas, in its fundamental principles that define the Being of beings.

This fundamental event in the history of Being happens, according to Heidegger's phenomenological hermeneutic, in logos disjoining from *phusis* and becoming discursive reason, logic, thus the truth stops being *a-letheia*, un-concealment, instead becoming the correctness of the assertion regarding Being, ultimately based on itself, that is, on reason,

on thinking. Heidegger writes that

From the point of view of the assertion, the true is attained when saying holds on to that about which it is making an assertion, when the assertion directs itself according to beings. Truth becomes the correctness of logos. Thus logos steps out of its originary inclusion in the happening of unconcealment in such a way that decisions about truth, and so about beings, are made on the basis of logos and with reference back to it-and not only decisions about beings, but even, and in advance, about Being (IM, 199).

Thus thought, rationality, becomes foundational regarding the standard of truth as truth, regarding what is reality, regarding that which is, Being. Heidegger writes “thinking becomes the ground that sustains and determines Being” (IM, 210).

Thus when *logos* is translated as thought, according to Heidegger, this translation completely misses the meaning it had for the pre-Socratic, as in Parmenides, for whom *logos* belonged to Being, and was not experienced as the thinking held by the human subject, for whom, thought underlies Being itself. This very shift, for Heidegger, is the historical event that open the modern understanding of Being, it *is* modernity.

Heidegger writes that “The entire Western tradition and conception of Being, and accordingly the fundamental relation to Being that is still dominant today, is summed up in the title *Being and thinking*” (IM, 220). This is how modern metaphysics, as first philosophy (Descartes), as transcendental philosophy (Kant) understands Being, as it will be articulated below through Heidegger's phenomenological hermeneutic of Descartes' and Kant's philosophies, that is, in the hermeneutic of the understanding of Being that comes to dominate modern times: Being as mathematical representing.

In that the Being of beings comes to be defined in the assertion and grounded in representing, Heidegger thus retrieves the concern with the categories (with basic concepts, with values) of all ontology. To assert indicates states of being as being-large, being-related, being-where, these are all “determinations of Being” (IM, 200) that is

determinations in which we find beings in their Being. Heidegger writes that “Because, as ways of Being-said, they have been created out of logos-and because to assert is *kategoroin*- the determinations of the Being of beings are called *kategoriai*, categories. On this basis, the theory of Being and of the determinations of beings as such becomes a theory that investigates the categories and their order. The goal of all ontology is the theory of categories” (IM, 200).

Heidegger contends that this becomes intelligible “only when we grasp that, and how logos not only separates itself from *phusis*, but at the same time comes forth *over against phusis* as *the* standard-setting domain that becomes the place of origin for the determinations of Being” (IM, 200).

Recapitulating the unfolding of this event that Heidegger considers fundamental for the history of Being, the Western historical understanding of Being, in that it precipitates the very beginning of metaphysics, he writes

Let us now look over everything that we have said about *phusis* and *logos*: *phusis* becomes the *idea* (*paradeigma*), truth becomes correctness. Logos becomes the assertion, the locus of truth as correctness, the origin of the categories, the basic principle that determinate the possibilities of Being. 'Idea' and 'category' will now be the two titles under which stand Western thought, action, and appraisal, under which stands all of Western Dasein (IM, 201-202).

With the interpretation of Being as *eidōs*, idea, and Logos as assertion, metaphysics proper begins. In this transformation are delineated the basic traits that will come to full fruition in the metaphysics, that is, in the understanding of the Being of beings of modernity, when Being is understood as the totality of objects versus the ideas (Descartes), the categories (Kant), the values (Nietzsche) of the human subject, the point of origin of basic concepts, the basic assumptions, the fundamental principles, by which

modern mathematical rationalism can proceed in all the true, law-like formulations of science, tested in the factuality of experiments.

2.7 The Priority of Being Becomes the Priority of Thought

Heidegger summarizes the overall understanding of the Being of beings of the ancient Greeks, in the twofold sense of coming-to-presence and enduring in it, he writes that “For the Greeks, ‘Being’ fundamentally means presence” (IM,64). But the “transformation of *phusis* into idea, of *logos* as gathering into *logos* as assertion” (IM, 206) that happens in the classical period, eventually resolves that

What is continuously coming to presence is what we must go back to, in advance, in all comprehending and producing of anything: the model, the *idea*. What is continuously coming to presence is what we must go back to in all *logos*, asserting, as what always already lied at hand, the *hupokeimenon*, *subjectum*. What always already lies at hand before us is, from the point of view of *phusis*, of emergence, what is *proteron*, the earlier, the *a-priori* (IM, 206).

In other words, in the ancient understanding of Being as *Phusis*, the emerging out of itself of beings precedes the human encounter, Being is prior in its sway of human understanding, the understanding participates in the appearing of beings which springs forth from *phusis*, from the *Being of* each being.

With Being fundamentally understood as the ideas and logic, now the assertions of human understanding start to relate not only to beings but also back to itself, to the ideas, the model, the correctness of the assertion is considered in view of the model. The priority of beings' presence, of Being, shifts to the priority of the ideas, of the model, of the principles, of fundamental propositions.

In Heidegger's phenomenological hermeneutic of philosophy, the history of Being, Being as *phusis* is experienced by the ancient Greeks, as “the emergent self-uprising, the self-unfolding that abides in itself, the overwhelming coming-to-presence that has not yet been surmounted in thinking, and within which that which comes to presence essentially unfolds as beings” (IM, 64). When *phusis*, Being is conceived as *eidos*, as the coming into Being of the form, of the model, of the *paradeigma*, the paradigm, and the *logos* as logical thought and assertion, both come to a predominance over *phusis*, i.e, over the Being of beings. Thought and assertion acquire priority over Being itself, which, for the ancient Greeks, was the prior.

In this fundamental transformation of *phusis* in *idea*, and *logos* in assertion, the idea and the assertion retain the predominance implicit in *phusis*, as the earlier, the *a-priori*, that which, in advance, brings beings forth to appearance, to presence. In this new delineation of the Being of beings, beings are brought forth as the objects of modern mathematical science, as the totality of the objects of nature, whose Being comes to be determined, *a-priori*, that in advance of anything else, even of beings' straightforward sensual appearing, out of human representing, out of mathematical representing, as both Descartes and Kant aim to articulate. The Being of all objects comes to be determined out of human appraisal and value judgments, out of basic categories, of foundational principles, which Kant calls the mathematical axioms, the principles for any true knowledge whatsoever, as will articulated below.

Now that the paradigm brings forth beings, produces beings as instances of itself, then human representing determines the Being of beings. Human representing sets the model of reality; it determines what is most true of Being out of itself, out of its ideas, out

of basic concepts, in values, in mathematical models.

This does not mean that the models are arbitrary, indeed the models aim to account for the phenomena and are formulated in view of the phenomena, yet they are based in advance by a representing of the Being of beings that excludes anything it cannot account mathematically. This means that *logos* as mathematical rationalism defines the whole of nature in view of nature but ultimately from itself, as will be articulated below. Thought, rationalism stands over against Being, it separates from its previous belonging to Being and thus knowledge, in a fundamental sense, becomes ultimately grounded in human effort alone, for instance, in the production of knowledge and technology.

In other words, in Heidegger's history of Being, all modern science and technology as the modern understanding of Being find their inception in the split of the unity of *phusis* and *logos*, and the experience of *phusis* as ideas, and *logos* as assertion.

In this split of Being and *logos* and the transformation of *logos* as assertion, Heidegger considers how the indicative (and this means ontological) naming for beings in general changes, he writes that “That about which something is said is in each case what lies at the basis of the *assertion*, what lies in front of it, *hupokeimenon* (*subjectum*). From the point of view of the *logos* that has become independent as assertion, Being displays itself as *this lying-there*” (IM, 199). The Greek word *hupokeimenon*, which Heidegger translates as “that which lies there before us”, that is, beings, is translated in Latin as *subjectum*, subject, as the beings that are the base of any knowledge and thus of the asserting proposition; beings are subjects, in the dual meaning of that which lies before us and are thus the subjects of the proposition, of asserting (subject, copula, predicate).

Christianity takes up the term, in that *subjectum* comes to denominate all beings, all beings are subjects, humans included, as creatures, as standing at the base, under the dominion of true Being, the one creator God. The Being of beings means for Christianity Being-created.

This creation, Heidegger points out, happens out of the pure thought, the pure reason of the one Creator, he writes that “beings have been created by God-that is, have been thought out rationally in advance-then as soon as the relation of creature to creator is dissolved, while at the same time human reason attains predominance, and even posits itself as absolute” (IM, 207), then the human takes the role of *the* subject in whose representing, in whose thinking the truth regarding beings, which now become objects, is to be obtained. As Kant puts it, the objects are “that which stand against” the subject.

In other words, in modern metaphysics the subject, the rational human, stands ground for any knowledge regarding beings as objects for modern science. This is prepared when the Being of beings, which was previously conceived as self-emerging and coming to presence, is conceived as the instantiation of the model, which Christianity experiences as the model thought out rationally by God in the creation of all created beings, that is, all beings as subjects of that which is highest. Then when the belief in the creator God recedes, the human being becomes the subject proper and all other beings are understood as objects, held and defined in the analyzing view of the eminent subject, that is, in human representing and geniality.

To summarize: this understanding of the Being of beings in matter and form, in thatness and whatness, in the coming to presence of beings in view of the paradigm, of the model Heidegger considers, becomes the onto-theological theme, originating with

Plato and Aristotle and playing itself out throughout all Western metaphysics,

This underlying strand of the history of Being begins with the transformative end of archaic Greek philosophy by classical Greek philosophy, and, for Heidegger, stretches from classical Greek philosophy via Christianity to modern metaphysics, as will be articulated below.

The understanding of Being that articulates the Being of beings in form and matter, in thatness and whatness reaches modernity via its new terminology of existence and essence, of actuality and possibility of Scholasticism which precedes and even prepares modern metaphysics. It is in this distinction that all metaphysics proceeds. Heidegger writes that “Being is divided into whatness and thatness. The history of Being as metaphysics begins with this distinction and its preparation” (TEP, 2).

This distinction, Heidegger contends, sustains all metaphysical thinking.

Heidegger writes that

Metaphysics has distinguished for ages between *what* beings are *and* that beings are, or are not. The Scholastic language of metaphysics is acquainted with this distinction as that between essence and existence. *Essence* means the *quidditas*, that which, for example, the tree as tree, as something growing, living, as *treelike*, is without any regard to the question whether and that this or that tree 'exists.' Here *treelike* is determined as *genos* in the double sense of origin and species, that is, as the *hen* to the *polla*. It is the *One* as the whence and as what is common to the many (*koinon*). *Essentia* names that which something like an existing tree can be, if it exists; that which makes it possible as such a thing: possibility (TEP, 2).

Thus this fundamental division of the Being of beings in thatness and whatness, in existence and essence, is also determined as the distinction between actuality and possibility (TEP, 3). This distinction which persists throughout Scholasticism, is taken up by modernity in that the existence of things is established in what they are as asserted to be in the fundamental propositions of human representing, in such a possibility, the

existence of beings as objects can and is assured, as Descartes posits and Kant aims to demonstrate in its transcendental philosophy, the metaphysics that attempts to ground all scientific proceedings.

In other words, the essence of things, what they are, is grounded in the propositions of human representing and ideas; human representing, as mathematical representing, comes to be that which grounds the existence of things, so that what cannot be measured by mathematical science is not real, it does not, in the proper sense of the truth, exist.

CHAPTER 3

From Scholasticism to the Beginning of Modern Metaphysics and Science

To arrive to the modern answer to the guiding question of the metaphysical tradition of the West, to the question of Being, consideration needs to be given to Scholasticism, out of which and against which, Heidegger considers, the modern understanding of Being emerges.

Usually the scientific method is considered the overcoming of the Church dogmatic doctrines, though the Christian understanding of Being only slowly fades away and really never completely. By being the historical context out of which the metaphysical stance underlying modern science emerges, it influences the way the new understanding of Being happens.

In other words, if Descartes initiates the metaphysical position of modern science he grounds it in the existence of God; Newton considered his most important writings those pertaining with the interpretation of certain controversial passages in the Bible; Kepler, by geometrically describing the rotations of the heavenly bodies, believed to participate in the pure geometrical reason of the Creator. In other words, these were men grown within the late Scholastic tradition and received their education within this tradition: they were men of their time.

The essential definition of the Christian conception of Being, as previously delineated, lies in the distinction between a creator God and all that is created, *ens summa* and *ens*, the most supreme being and all beings. Heidegger writes that

Biblical revelation, which according to its own report rests on divine influence ('inspiration'), teaches that the being was created by a personal creator God and is preserved and guided by Him. Through the truth of revelation, promulgated in church

doctrine as absolutely binding, the question of what the being is has become superfluous. The Being of a being consists in its being created by God (Omne ens est ens creatum) [every being is a created being]. If human knowledge wishes to know the truth concerning beings, the only reliable path left open to it is to adopt and preserve diligently the doctrine of revelation and its transmission by the doctors of the church. Genuine truth is mediated only by the *doctrina* of *doctores*. Truth has the essential character of 'doctrinality.' The medieval world and its history are construed on this *doctrina*. The only appropriate form in which knowledge as *doctrina* can express itself is the *Summa*, the collection of doctrinal writings in which the whole content of traditional doctrine is arranged and various scholarly opinions are examined, accepted, or rejected on the basis of their conformity to church doctrine (N IV, 88).

In this sense, the question regarding the Being of beings is answered with such authority as to lose all its questioning power. Thus Heidegger contends that Scholasticism is philosophy only by name, but that philosophy and the "philosophy" of Scholasticism are as incompatible as any two things can be, that is, Christian faith and philosophy are fundamentally different (N IV, 88). That is, if philosophy is the striving toward the essential, that is, fundamentally ontological questioning, Scholasticism pertains with the answers already delineated in the *Summa*, which can only be elucidated, in the explicating works of the schoolmen, the scholastics (N IV, 89).

For Catholicism, Heidegger contends, fundamentally Being means being-created by a supreme being, which is then a falling from the true Being. Thus a chasm is opened between true Being as Creator and the created as falling from the previous higher and true state of Being, that is, between the otherworldly, up there, and the worldly, down here; the cleavage between essence and existence, between the sacred and the profane, the soul and the flesh, all these reflects this basic trait.

The meaning of Logos now becomes the Word of the Lord through his Son, Jesus. The way back to true Being is in following the word of Jesus, as the intermediary and messenger of the path to redemption from the fall. Heidegger writes that "All history

becomes the history of salvation: creation, the fall, redemption, last judgment” (N IV, 89). The way to the salvation of the soul becomes the established concern of Medieval Dasein, of Medieval humanity.

The path to salvation is the one delineated by the teachings, the “schooling” of the scholars of the church doctrine. The self proclaimed surety of the “revelations” provides the sureness and certainty for the human being knowledgeable proceeding in the world. Heidegger writes that “All knowledge is tied to the order of salvation and stands in service to securing and promoting salvation” (N IV 89).

Furthermore Medieval Christianity also appropriates the Greek tradition, especially Plato and Aristotle, into its conception of Being and reinterprets them according to its doctrine, in an imposing edifice that will start to crumble with the dissatisfaction of few individuals, staking the emergence of modern metaphysics and science, in the foundations for a new edifice, out of the same ground.

Heidegger interprets that the beginning of modern science, the grounding of its validity, and the sketching of its metaphysical position within the history of Being, that is, its possibility relies in the previous Christian positing of that which is, of Being, and it thus emerges in contrast with Scholasticism, but also drawing from it. If Descartes participates in the clarification of the metaphysical foundation of modern science, he does so within the predominant Christian conception of Being.

Indeed, Heidegger points out that until the Seventeenth century, the conception of a personal creator God is present as the very core of the historical Dasein (the openness that we are), the human being of that time. Only later with Nietzsche does the slipping grip of Christianity reaches such a degree that its predominance fades away, but, as said

before, not its presence; it becomes secondary, or better yet, it becomes the shaded side of the same coin, as that history which science can go back to, in contrast, in order to reassert and secure its own validity, without acknowledging its complex relationship to it.

Heidegger stresses that Catholicism is not philosophy. Catholicism cannot regard the question of Being, because Catholicism is the authoritative and definite answer to the question of Being. There is no questioning the *Summa* as to its veracity, all that is permitted is to ponder regarding the true interpretation of the sacred texts, where the logos, the word of the personal God has been handed down through its son.

The usual delineation of the inception of modern science is that the first scientists, such as Galileo, Descartes, Newton, began the sweeping of church dogma with the light of modern science, and initiated the human search for knowledge free from the encumbering weight and obfuscations of Church doctrine and beliefs; yet such a description does not encompass the way the movement toward a different historical Being happens.

For Heidegger points out that the change in the understanding of Being happens in the slow back and forth emerging of a new metaphysical position, a new understanding of Being and as such a new definition of truth and of the being that is human. This shift to a new understanding of Being is not a clear cut and overnight happening, but a slow and ambiguous process.

3.1 The Catholic Understanding of Being and its Reinterpretation of Ancient Greek Philosophy as the Context of the Arising of Modern Metaphysics Whatness and Thatness become Essence and Existence

Heidegger traces the metaphysical ground underlying modern science in its

emerging out and against the understanding of Being of Medieval Christian humanity, codified in the assertions of Catholicism (c.1554). Catholic means “the doctrines of the ancient Church, universally accepted”. It comes from the Latin *catholicus* which means “universal, general”, which itself derives from the Greek *katholikos* which means “about the whole”: Catholicism then means the universal doctrine of the Church, the body of knowledge determining Being as a whole, so prescribed by the authority of the scriptures, the *Summa*.

The understanding of Being which runs from ancient Greek philosophy to Christianity, up to the beginning of modern metaphysics and science is that the Being of beings is understood within the fundamental division of *morphe* and *hule*, of form and matter, of whatness and thatness, of what something is and that it is, the concept of table valid for all tables and this table here, the universal concept and its particular. These are articulated in their Latin translations as essence and existence, as possibility and actuality.

Starting in the Middle Ages when manuscripts from ancient Greece became available in Europe, the scholastics translated and reinterpreted them within the Church doctrine, especially Plato and Aristotle. So, for example, the question regarding Being which Aristotle dealt with in his *prote philosophia*, the philosophy regarding what is first in rank, regarding the ground from which all movements of beings proceed, becomes absorbed and translated in Christian theology in view of the creative genesis of the Christian god. While Plato’s articulation regarding what is highest among the ideas, *agathon*, the beautiful, is again translated in view of the one creator god.

Heidegger attributes the most significant and determinative annexation of ancient Greek philosophy by Scholasticism to Francisco Suarez (1548-1617). The loose

structure of the major manuscript of ancient philosophy, Aristotle's *Metaphysics*, comes to be interpreted and systematized within the church doctrine by the Spanish Jesuit, who also coins the word *ontologia*, ontology, the study of Being, the modern designation for metaphysics.

This systematization provides the baseline out of which and against which Descartes proceed in his task: the clarification of the ontological foundation of the emerging scientific sciences. Suarez, in appropriating the work of Aristotle within the Church doctrines, draws the fundamental definition of Being in the two main categories of *ens infinitus* and *ens finitus*, being infinite and being finite; plus other definitions which relate this fundamental delineation, such as the being that is from itself and the being that is from another, the being that is necessary and the being that is contingent, etc.. Heidegger highlights that among these various definitions the most decisive and influential for modern science, is the division of Being into *ens increatum*, the being that is not created, and *ens creatum*, the being that is created (BPOP, 82).

This conception of the main division of the Being in the dichotomy of “being that is not created” and “being that is created” is then articulated within the division of essence and existence. Thus Scholasticism primarily delves in this framework in the articulation of the relation of essence and existence in God, the uncreated Supreme Being; and the relation of essence and existence in all that is not God, in the beings that are created.

In God, the being that is not created, essence and the existence coincide. The uncreated being, God, is necessary, “it cannot not be...actuality belongs to its essence” (BPOP, 82), it is “pure actuality without any possibility” (BPOP, 82). That is, God is pure

actuality and possibility does not affect it, that is, “God’s essence is his existence” (BPOP, 82), the essence and the existence coincide in this being, necessarily; whereas the problem between the two obtrude itself in reference to the *ens finitum*, that is in reference to the being that is created and whose finitude includes the possibility not to be.

Heidegger writes that “Actuality devolves only to the possible, to that which can be something, that which is according to its what, to its essence” (BPOP, 82). That is to say that all finite beings receive their actuality from their possibility, their essence, their whatness; and for Catholicism this is dictated by a creative act of god.

For Aristotle the Being of beings was the coming together of thatness, that something is, and whatness, what something is. Heidegger writes that whatness “is that which we return, in the case of a being, when we answer the question raised about this being: *what* is it? *ti estin?* Aristotle formulates more exactly this what, which defines the *ti estin*, as to *ti en einai*”, which Heidegger translates as “that which a being already was” (BPOP, 85). Thus Heidegger writes “Scholasticism translates this as *quod quid erat esse*, that which each thing already was in its thingness, before it became actual. Any thing-a window, a table-was already what it is before it is actual, and it *must already have been* in order to become actualized” (BPOP, 85). As Heidegger points out in any human producing, that which is produced must be conceived in advance, a thing must be thought out in its design, before any construction can begin.

Yet Aristotle meant this in the sense that each individual being is from its beginning already toward itself, toward its fulfillment, its *telos*, not as something above and beyond each being, but in their very specific presence in which the being fulfills itself as the being that it is, however this happens, as the seed is always already moving toward

becoming the tree, and the wood of the tree can become a table.

Heidegger indicates that whatness, essence, is also understood as definition, which comes from the Latin *definitio*, he writes that

This whatness that is circumscribable in the definition lends to each thing its determinateness and sure distinguishability from other things, constituting its delimitability, its figure. The definite circumscription, the certitudo (*perfectio*), is determined more exactly as *forma*, morphe” (BPOP, 86).

As said above, this has its origin in Greek times, the form is the figure a being presents to us. Form is the *eidos*, that is, what a being is, precisely in the view of “how-the-thing-looks”. Thus Heidegger underlies that essence as form, as morphe, goes back to the *eidos* “that as which a thing is sighted”. Heidegger writes that

That which constitutes the proper determinateness of a being is at the same time what is at its root, the radical, from which all of the thing’s properties and activities are determined and prefigured. Hence what is thus rootlike in a being, its essence, is also designated as *natura*, the Aristotelian use of *phusis*. Today, too we still speak of the ‘nature of the thing’ (BPOP, 86).

In other words when we say the nature of reality, we mean nature not as all the objects and phenomena of the universe, but in the sense of its fundamental definition, its essence, and this sense of nature comes to modernity through the reinterpretation of Aristotle and Plato by Scholasticism.

But if for Aristotle the whatness of a thing is co-present in the thatness, in the very presence of each being, that is, whatness is to be found only in each specific being; for Plato on the other hand, whatness, *eidos*, is elevated to a position of precedence over all specific beings, and thus over the Being of all beings. The *eidos*, the form of any being and the highest *eidos*, form, for all beings, beauty, precede any being. From Plato's sense of *eidos*, idea, whatness starts to move in the direction of being understood as that which

makes beings possible, as essence, as possibility, as cause, as origin, which is then so taken by Scholasticism, as the initial cause that God is.

Scholasticism completely appropriates Plato's understanding of Being: translating the *eidos* as *essentia*, as that which precedes the actual individual beings and as that which is its true being, as the possibility, the essence, for each being to become actualized, to exist. And this possibility comes to existence in its being contemplated by the personal creator god.

For Catholicism that which is, Being, is God. God is both essence and existence. God, by definition, is never not existent; on the other hand, for that which is created, for such a being its essence and existence must come together so that it can become existent, and its essence, as possibility, is prior and precedes their existence. In the Scholastic translation of whatness as essence and as possibility, both of these precede the becoming actualized of each being, its becoming existent, its existence. The creative, pure, acts of god produce the essence or the possibility of beings' existence; the only thing that remains questionable here is the specific accounting of the relation of this coming together of essence and existence.

Scholastic thought, then, revolves and focuses around how essence and existence, possibility and actuality are to be understood in God and in all that which is created. So that if for God's essence is his existence, that is, these two coincide, for the finite beings this is not so clear, and thus many different positions are taken about the relation between essence and existence in finite beings. In the relation of the essence and existence, of possibility and actuality, a being is, that is, the Being of beings is here to be found. The understanding of the Being of beings, in whatness and thatness, is thus conceived and

articulated in Scholasticism. Heidegger contends that this framework in which the Being of beings is articulated, starting from the Greeks, persists throughout all the metaphysics of the West, without modern philosophers ever been aware of its Greek inception.

Heidegger contends that how whatness and thatness comes together finds different historical answers. Yet from the post-Socratic on, and especially from the Romans and their absorption by Catholicism in essence and existence, *essentia* and *existentia*, their coming together is understood more and more, in the causative sense of bringing forth, of producing, specifically in the sense that what something is, is causative for the fact that something is.

Heidegger considers this position a forgetting of the beginning of Greek philosophy, of the pre-Socratic philosophers, that is, when Being is understood as that which emerges-out-of-itself, *phusis*, unconcealing itself in the presence, gathered by the *logos*, of beings, which first are, they appear out of themselves, and thus in appearing offer a look, *eidos*, what they are, in *aletheia*, in the unconcealed truth of what they are, which is a consequence of the fact that they are. This Heidegger considers the more original approach out of which all subsequent are founded.

Toward the end of Greek philosophy, with Plato and Aristotle, the understanding of Being as presence is still understood in the twofold sense of thatness and whatness. Heidegger considers that Aristotle's philosophy moves in the preeminence of thatness, that is, experiencing the Being of beings in the priority of a "This One", of the singular, that is, *ousia is* understood as the presence of the motion of form and matter, of *energeia*, in each being, and this is closer to the ancient Greeks. On the other hand, Plato emphasizes the priority of whatness, of *eidos*, of what something is, which places

whatness, the form, the idea, the concept, over existence, and he is thus more in resonance with medieval and modern thought. Heidegger considers that *eidos* becomes idea in the modern sense of the word and “this becomes representational thought” (TEP, 10).

It is from such a delineation that the Being of beings begins to move in the direction which leads to the time when, at the beginning of modern metaphysics, the human being becomes the one called upon to decide regarding thatness and whatness in their reciprocal allocation, via the Scholastic interpretation of this twofold sense of the Being of beings in essence and existence.

To recapitulate: the post-Socratic Greeks understand the Being of beings in view of thatness and whatness. What something is, its form, its *eidos*, its idea; and thatness, its matter, that something is, its existence; in the specific articulations of their relation, the Being of beings is delineated. Plato distinguishes the priority of whatness, of *eidos* over matter, while Aristotle distinguishes a certain priority of whatness, yet always in view of each specific being, that is, of thatness, of existence.

This twofold approach reaches Medieval times and is reinterpreted by the Scholastics in view of the Catholic doctrine of revelation. These basic concepts, of form and matter, of whatness and thatness are reinterpreted as essence and existence, as possibility and actuality, in view of the fundamental doctrine of an uncreated, infinite creator and all the created and thus finite beings. Thorough Scholasticism these concepts reach the beginning of modern metaphysics, and are there also appropriated and reinterpreted, becoming part of the articulation of modern metaphysics as the base for modern science.

3.2 Scholasticism and the Arising of Modern Metaphysics: Pure Reason and the Mathematical.

For the Medieval human being, in Scholasticism, the Being of beings finds its ground and only source in the personal God who created all beings. Among all beings created, the human being holds a special place, for this being the concern of redemption from the fall is central to his life, in the procuring of the certainty of salvation, that is, the return to his source through following the logos, the Word of God's messenger, his son. The human being, in this sense, is special, in that she is created in the image of the divinity, and is thus endowed with rational thought and speaking.

In Scholasticism, the Being of beings is understood in view of the creation of all beings. How then, specifically, creation comes about? Creation is characterized in terms of bringing forth, of producing out of pure conceiving, of pure thought. Pure means a conceiving that is the very ground, that is, it not based on anything else but itself. The creator god creates out of such pure thought, out of pure reason. Since all true knowledge must be based on the one creator, knowledge of any being must refer back to the one creative source of all beings.

In this sense, when knowledge, as the knowledge accessible to the human being is conceived, it is conceived as based upon the way the most supreme being, God, knows. The knowledge of all worldly beings must be founded in the way divine knowledge is itself founded, that is, in the pure reason out of which the most perfect, necessary, uncreated being creates all beings.

Thus, in the Scholastic tradition knowledge, in the most general sense, is to be referenced back the creator's purity of thought, the pure thought, the pure *ratio*, the pure

reason of god must be emulated, thus providing guidance also to the proper knowledge that belongs to man. The tripartite organization of Christian metaphysical knowledge, that is, “God (theology), the world (cosmology), man and his eternal salvation (psychology)” (WT, 109) are thus articulated and formed out of pure reason so that, Heidegger writes, “theology becomes *theologia rationalis*, cosmology becomes *cosmologia rationalis*, and the doctrine of man, psychology, *psychologia rationalis*” (WT, 109).

Heidegger traces that the Greek *logos* is translated in Latin as *ratio*, Heidegger writes that “Considering and expressing something as something in Latin is called *reor*, *ratio*. Therefore, *ratio* becomes the translation of *logos*” (WT, 64), that is, *logos* becomes reason.

Regarding *ratio*, reason, Heidegger writes that “The simple asserting simultaneously gives the basic form in which we mean and think something about the things. The basic form of thinking and thus of thought, is the guideline for the determination of the thingness of the thing” (WT, 64). That is to say, that reason as the simple form of asserting becomes the guideline for the determination of the Being of beings.

In other words, in reason, in the logic proposition the Being of beings comes to its fundamental determination. The definition of any being, so that this being can be knowledgeably encountered and approached as existent, in the truth of its being, is asserted by way of reason. Since for the Medieval human being any being was such a being in light of the essence brought forth in actuality by its creator in pure reason; at the beginning of modern metaphysics too, human knowledge about beings in the most general and true sense must refer back to such pure reason, expressed in the proposition.

For instance when at the very beginning of modern science, new advancements in astronomy were accomplished, the scientist understood those advancements as the participating in the rational divine plan out of which all that is, in this case the geometrically conceived movement of the astral bodies, achieved by the human in his comprehending the harmony and elegance of the geometrical movement of the planets and of all celestial bodies.

Within this approach, God becomes the ultimate geometer as some pictorial representations of the time depict God holding a pair of compasses. For example, Johannes Kepler (1571–1630) writes “Why waste words? Geometry existed before the creation, is coeternal with the mind of God, *is God himself* (what exists in God that is not God himself?); Geometry provided God with a model for the creation and was implanted into man, together with God’s own likeness-and not only merely conveyed to his mind through the eyes” (Borfort 1996, 183). Again, God fashions creation out of the pureness of thought, of pure reason, out of pure geometrical thought.

Knowledge, in the late Middle Ages, is referenced back to the pure geometrical thought of the creator, it is the partaking in the rational plan of the creator. The meaningful order of everything emanates from the rational plan of the creator. Still this rational plan was accessible only through church doctrine. The path to knowledge is rendered in the interpretation of the *doctrina* “guided by God’s grace and by the inspired texts of the ancients” (Guignon 1983, 21) to uncover the truthful and sometimes hidden meanings found in the scriptures and embodied in the world. The highest human knowledge is found in hermeneutic: to truthfully interpret, the sometimes hidden meanings of the *Verbum*, the Word of God as transmitted in the Scriptures, and also

present in the works of the ancients.

Heidegger writes that in Medieval times the real locus of truth has been transferred by Christendom to faith-to the infallibility of the written word and to the doctrine of the Church. The highest knowledge and teaching is theology as the interpretation of the divine word of revelation, which is set down in Scripture and proclaimed by the Church. Here, to know is not to search out; rather it is to understand rightly the authoritative Word and the authorities proclaiming it. Therefore, in the Middle Ages, the discussion of the words and doctrinal opinions of the various authorities takes precedence in the acquiring of knowledge (QCT, 122).

It is within this context, the Christian understanding of Being as creation out of pure reason and held in the sacred texts of the Church, the authoritative word of the revealed doctrine only open to be further interpreted and clarified by the authorities, that modern metaphysics and science arise.

Against the usual accepted delineation of the insurgency of the first scientists against the late Scholasticism when the pursuit of knowledge had deteriorated into a mere empty arguing over the meanings of the written body comprising Catholicism, Heidegger uncovers, underneath this very real dissatisfaction toward the Church doctrine, also a transposing of fundamental aspects of the historical understanding of Being from ancient and Medieval philosophy into the new impetus of the emerging new science.

A central aspect to this new understanding of Being is the arising of mathematical knowledge. Heidegger points out that in the late Middle Ages mathematics was emerging “more and more as the foundation of thought and was pressing toward clarity” (WT, 100). After the Crusades (11th and 13th century) many ancient manuscripts from Greece

and the Islamic world pertaining to mathematics and geometry became translated in Latin and were being studied, becoming available in a time when the first universities were being established throughout Europe.

Heidegger contends that the two main aspects that modern metaphysics appropriates from the late Scholasticism are “the Christian conception of entities as *ens creatum*”, that is, existing out of a creative act of pure reason; and its “basic mathematical character”, that is, the arising of mathematical knowledge.

As already said, Heidegger interprets that in Medieval ontology, in Scholasticism, beings are understood as existent, as actual, and real in reference to the creative act of the creator. The Catholic interpretation of the world, in conformity with the creation story of Genesis, is that every being that is not God himself is created. Actuality is understood in view of the actualizing act of the creative spirit, in view of the two concepts of essence and existence. The pure creative act of God creates the essence that gives form to every and each material being, to each thing.

Heidegger articulates that “This presupposition is simply taken for granted. And even if creation out of nothing is not identical with producing something out of a material that is found already at hand, nevertheless, this creating of the creation has the general ontological character of producing. Creation is also interpreted in some sense with regard to production” (BPOP, 118). That is, existence is not the actual itself but the actualizing of the actual, that is, the presence of beings (what is actual) is brought about by a producing, a bringing forth of the form to the matter, an actualizing from the creative sight of the essence of the actual, and from something that already is, the material, the matter.

As indicated above, in the most general sense, beings are conceived as created, they come to be out of the pure thought, the pure reason of God, in this sense they are produced, brought forth as actual. The meaning of to produce from the Latin *pro-ducere*, in the late Middle Ages, is to bring forth, to bring into being from that which leads, in advance of everything else, and so is first in rank: the pure reason existing in God.

Modern metaphysics begins with the slow dissolution of the understanding of the Being of beings by which knowledge in general rests in the relation between the created and the creator, the basis for any knowledge whatsoever is no more to be drawn from the doctrine of the doctors of Scholasticism, that is, the hermeneutic of the sacred texts. Yet now the principles of knowledge in general are still to abide to the purity of reason.

In other words, knowledge at the inception of modern metaphysics, on the model of the pure reason of god, still relies on such pure thought. Heidegger writes that “the faculty of knowledge, pure reason, has been established as that by whose guidelines all definitions of what is, the thing, are to be made in rigorous proof and grounding” so that “it is now a question of positing out of the essence of pure rational knowledge a sketch of the being of what is, that will be decisive for everything further knowable” (WT, 116). The foundation of any knowledge does not concern with interpreting and clarifying doctrinal knowledge, it is a matter of delineating “a sketch of the being of what is”, out of the pure, mathematical knowledge of which the human being is capable.

Throughout Western philosophy, from Aristotle up to the beginning of modern metaphysics with Descartes, truth is understood as the correspondence of thought, expressed in the proposition, with the things. In Medieval time, this was expressed as the “Truth (*veritas*) is the *adaequatio intellectus et rei*” (WT, 117), truth is the correspondence

of the intellect with things. The truth is the thoughtful asserting about things, it is saying about things what things are, it is such a correspondence. In Medieval times the truth must conform to the essence purely reasoned by the supreme being. Heidegger writes “A proposition is true insofar as it corresponds to things. Such correspondence does not only relate to the things, but also to things insofar as they are created, based on the project of a creative spirit and as they correspond to it. Conceived in this way, truth is the commensurability of things with their essence, thought by God” (WT, 117).

The Being of beings, that is, the truth regarding beings as beings, is to be established in the propositions corresponding to beings, but how are beings conceived so that the truth can be properly established in such correspondence? In other words, when the Being of beings is no more conceived in light of the essence pre-given and produced by the creative spirit, and thus in view of such essence, now the Being of beings is still to be defined first and foremost out of the proposition guided by pure reason.

That is to say that, before any truth can be obtained, the fundamental approach to beings must be laid in advance by the purity of reason, by mathematical thought; the essence of truth is tied to how beings are conceived in their Being, their essence, in their basic nature, and this is laid out in ontology by the human being. Which first proposition will say what beings are, thus opening the way to speak of beings truthfully? And how is this first proposition arrived at? Heidegger writes that “This happens first in the fundamental discipline of metaphysics, in *ontologia*” (WT, 116), in ontology.

Heidegger writes that “Because beings have been created by God—that is, have been thought out rationally in advance—then as soon as the relation of creature to creator is dissolved, while at the same time human reason attains predominance, and even posits

itself as absolute, the Being of beings must become thinkable in the pure thinking of mathematics” (IM, 207).

The new studies of geometry and mathematics had brought attention to the self evidence of the validity of geometrical and mathematical propositions; these pure mathematical propositions are grounded in the clarity of their own self transparent validity. Now, Heidegger writes that

what is decisive is that...through the development and self-clarification of modern thought as the mathematical, the claim of pure reason has come to predominate. This means that the most general determinations of the being of what is are to be projected on the ground and with the guidance of the most universal principles of pure reason...The entire knowledge of the world, the soul, and God is to be derived from these most universal concepts in a purely rational analysis and sequence (WT, 118).

The initial movement of science coming into being happens within the tradition’s understanding of the Being of beings as that which is created, produced, brought forth by the pure reason of God. Now though, it is no more the matter to elucidate the Word of the sacred scriptures. Now the matter is to sketch a new delineation of the Being of beings, and this is carried precisely according to a reason that is pure, that is, a reason that, in its purity, in its priority over everything else, is to define the very principles of what beings *are*, the essence of their Being, which is not pre-given by the word of God anymore, but still by the word of pure reason.

At the beginning of modern metaphysics, God still dominates, and is the ground of all knowledge, that is, knowledge is to be grounded in the pure reason of God, a pure reason that the human being can exercise according to pure reason itself. For Descartes, the Being of beings is to be grounded in a new way, still within the certainty of the benevolence of God that assures the veracity of such knowledge. But in the new delineation of the principles of the fundamental understanding that is to ground all

science, all knowledge in the proper sense, the human is to proceed on his own guided by the use of the pure reason available to him, as mathematical thought becomes available to the Western world.

In such a new delineation of the Being of beings, modern metaphysics arises on the model of the tradition's approach to the Being of being, that is, that is to be based on pure reason, and thus asserted in the most fundamental propositions defining the essence of beings, regarding what beings *are*; moreover mathematical knowledge becomes also decisive as a knowledge that is pure, that is clear and self evident in and of itself.

In other words, Heidegger considers that the other basic aspect that modern metaphysics retains from the late Medieval tradition is the study and use of mathematics and geometry. In that geometrical thought comes to be highly estimated as purely rational in the self-evidence and self-consistency of the demonstrations of its theorems, and in its applicability, for instance, to account for the movements of the planets. Mathematical thought becomes highly regarded in both its abstract, intrinsic self-consistency, and secondarily in its applicability to beings.

3.3 The Mathematical as the Guiding Approach of Modern Metaphysics

The Mathematical Projection of Nature

Yet Heidegger gives an unconventional interpretation of the mathematical. The meaning that Heidegger retrieves in the mathematical is ampler than just involving geometry and mathematics in the strict sense. The mathematical in this sense relates to the pure reason out of which the essence of beings is to be reached; the mathematical

characterizes the thinking that reaches, in its purity, for the first principles of knowledge in their explicit and demonstrable self-evidence. In other words, the mathematical is equated to the metaphysical, to that thinking that considers the essence of beings so that beings can and must be studied using mathematics and geometry.

Heidegger contends that what are usually considered the three most basic characteristics of science, that is to say, that science is based on facts, that it is experimental research, and that it is a calculating and measuring investigation (WT, 68), that is, that science computes in mathematical terms the experiments about the facts of the world, though valid, does not touch what science is.

What essentially marks its inception and rules science's proceeding, Heidegger traces to this ampler interpretation of the mathematical character of modern science. Heidegger retrieves another interpretation of the guiding feature of modern science, for the modern sense of the truth, for knowledge proper. For him the guiding feature of modern science is articulated in this mathematical character.

Heidegger contends that for science to be characterized as “factual, experimental and measuring” still “misses the fundamental characteristic of modern science” (WT, 68). Heidegger writes that “The fundamental feature must consist in what rules and determines the basic movement of the science itself. This characteristic is the manner of working with the things and the metaphysical projection of the thingness of things. How are we to conceive this fundamental feature?” (WT, 68).

In other words, now that the Being of beings is not to be retrieved in the doctrine of Catholicism, by which the essence of beings, of things, has been delineated in the imposing edifice of Catholicism, inclusive of the reinterpreted knowledge of the ancient

Greeks, especially of Plato and Aristotle, what is the new approach to delineate the essence of beings, regarding the Being of beings, the thingness of the thing? The new approach, since it reaches for the very essence of beings, of things, for the nature of things, must be mathematical, as the mathematical is itself a reasoning that is pure, that is, it is a reasoning that is established in the self-evidence of its axioms and demonstrations, before any applications to practicalities.

In Medieval times the word for beings that is used besides the Latin *ens* is the Latin *res*, thing; so that besides the expression the Being of beings, Heidegger uses also the expression the thingness of things, meaning the nature of things in general. That is, what is that which makes a thing, the thing that it is as a thing? Descartes does not rely anymore in the doctrine of the *doctores*, of the schoolmen, whose knowledge was authoritatively based on the divine revelation of the essence of things. Now the essence of things, the thingness of the things, the Being of beings must be thought out anew, yet, still out of pure reason, that is, out of the thought that is mathematical.

Heidegger entitles the essential and guiding feature of modern science as the *mathematical projection of nature*. For Heidegger the mathematical character of modern science does not primarily or solely relate to the use of geometry and numbers, or of today's statistical analysis; for him the mathematical in modern science relates to the in advance determination of the most fundamental approach to beings in general, which sustains the whole of modern science, and thus allows all relations and interactions with beings, within the scope of possibilities that it casts out of its decision regarding the question: how does it stand with Being? This is the matter of ontology, of metaphysics, of first philosophy, as the major work of Descartes clearly states, *Meditations on First*

Philosophy. Heidegger names the metaphysical stance of modern science, which opens up the scientific study of all nature, and which, he contends, comes to guide all modern science, as the *mathematical projection of nature*.

3.4 The Meaning of the Mathematical Projection of Nature

On the model of God's creative production of the essence of any being, and in its place, now pure reason, mathematical thinking is to see the essence of beings, so that upon this fundamental knowledge all the specific knowledge about beings can proceed out of this most general knowledge. The mathematical is that thinking that in advance must articulate, bring forth, produce the essence of beings, as beings truly *are*, so that any further knowledge of them can be obtained, as built upon the purity of the first delineation of the Being of beings, the fundamental principles of the nature of things.

Thus Heidegger interprets that, at the inception of modern science, the mathematical comes to have this fundamentally determinative character for all modern science, not solely in the use of mathematics, of the numerical and the geometrical, in the specific and preponderant manner in which they do, for Heidegger, both in classical physics and in contemporary particle physics, and science in general, but in the merging of the mathematical with the metaphysical.

Heidegger writes “We are long used to thinking of numbers when we think of the mathematical. The mathematical and numbers are obviously connected. Only the question remains: Is this connection because the mathematical is numerical in character, or, on the contrary, is the numerical something mathematical?” He answers that “The

second is the case” (WT, 70).

Heidegger traces and interprets the modern meaning of the mathematical from the ancient Greek word *ta mathemata*. He writes that the mathematical is

that ‘about’ things which we really already know. Therefore we do not first get it out of things, but, in a certain way, we bring it already with us. From this we can understand why, for instance, number is something mathematical...we can count three things only if we already know ‘three’. In thus grasping the three as such, we only expressly recognize something which, in some way, we already have (WT, 74).

This “to already have” is the mathematical.

Heidegger points out that the knowledge of what something is, as a specific kind of thing, like a weapon, or as a thing in general, in the most general sense of the word, is that knowing one already has with oneself in encountering all the things of the world. Precisely in this knowing all things are rendered intelligible as to what they are in general as things, or what they are as specific kind of things, and this knowing is taught and learned. This knowing, that is already there in the ordinary and basic re-cognition of anything, is the mathematical.

An example Heidegger uses to explicate the full sense of the mathematical is that when we count to three, we do take the threeness out of the things counted, he writes that “things do not help us to grasp “three”, i.e., threeness...the number in the natural series of numbers that stands in third place” (WT, 74). Threeness is not accrued from the things, but we know threeness in advance so that we can bring it to bear in our encountering with things.

Heidegger does not engage any speculation on the origin of numbers, either from the things or as a human invention; he aims to stay with the phenomenon itself in its happening. There are no numbers in the world in the readily visible presence of beings, as

there are no concepts, we bring these when we grasp and understand things as we have learned them to be, as these have been taught to us, we are taught and learn what trees are, and to count how many there are in the yard.

Heidegger interprets the mathematical as that about beings which the simple perception of beings does not provide immediately, so that we bring it ourselves about them. Nothing in the simple perceiving of the forest, would say “forest” to us, one has learned that, and nothing in the use of the forest brings about the counting of the trees, necessarily, one has been taught to count. In the same way, Heidegger contends one perceives trees as trees, because one has learned what trees as trees are, one has learned tree-ness, what is fundamentally tree-like, this is not written anywhere on the trees, this knowing happens in us, and not randomly but in view of those beings one calls trees, and this knowing is teachable and learnable, that is, passed on from human to human.

In such a way one learns what is plant-like for all plants, not by going from plant to plant, one is taught in that general sense of what the plantness of the plant consists of, so that one can perceive plants as plants. Thus this most basic knowledge must be present already in oneself to encounter the plant as the plant is. And this also happens for encountering things as things, things viewed in the most general possible way, that is, regarding the fact that they are at all, regarding their Being. Such is the mathematical as Heidegger reinterprets the meaning of the word from its use by Plato.

The mathematical pertains with that general and obvious knowledge which defines the general character of things, the thingness of the thing, the Being of beings, and which works in advance in all our constant copying with beings. It is that basic understanding that, in all that we do, tacitly renders, as from a background, a being as the

being that it is, i.e., as presence in the coming together of form and matter (Greek Dasein), or a creature, a created being (Medieval Dasein), or an object of human perception and representation (modern Dasein), or a product of evolution, and a mere resource disposable in human management and consumption (current Dasein).

The mathematical refers to what we must already know about beings in general, that is, what and how they are as beings or as specific kind of beings-plant, animal, inanimate; so that beings can be intelligibly encountered and the further learning of all that pertains with them can proceed, as in their use, maintaining, or their making. The mathematical in this sense delineated by Heidegger's interpretation of the Greek word *ta mathemata* from the philosophy of Plato, is that general knowledge regarding beings, in which beings become intelligible at all in a human encounter, so that a more specific learning can proceed from it. It is a knowledge that works in advance in the re-cognition of anything as to what it is, the house there, the tree lined curb, the tunnel of the particle accelerator, the painting on the wall, etc., that is, it is the most basic knowledge which can be taught and learned and which allows us to comport in any way towards any being whatsoever.

What a tree is, is not immediately given in its simple appearing, in just looking, or smelling, or touching the tree, we must have been taught what a tree is, the treeness of the tree, so that one encounters the tree as tree. Heidegger then contends that geometry and mathematics stand clearly as mathematical; that is, they are a knowledge that is not taken by a simple apprehending from things, and geometry and mathematics are teachable and learnable, they are passed on, and are thus present in advance in our encountering with beings. Heidegger writes that

Modern physics is called mathematical because, in a remarkable way, it makes use of a quite specific mathematics. But it can proceed mathematically in this way only because, in a deeper sense, it is already itself mathematical. *Ta mathemata* means for the Greeks that which man knows in advance in his observation of whatever is and in his intercourse with things: the corporeality of bodies, the vegetable character of plants, the animality of animals, the humanness of man. Alongside these, belonging also to that which is already-known, i.e., to the mathematical, are numbers (QCT, 118-119).

The mathematical, as Heidegger interprets it, in its broadest sense, is the specific connotation of treeness, of plantness, of livingness, of thingness, that we already have in encountering trees, plants, living beings, beings in general.

The mathematical, in the original Greek sense of Plato's philosophy as interpreted by Heidegger, is that which is teachable and thus learnable regarding beings, that which is most generally known regarding beings, that is, regarding the fact that they are, as beings, as living beings, as plants, as trees; which then works in advance in our recognition of their being trees, plants, living beings, beings. That is, ultimately regarding their Being, that is to say, the understanding of the Being of beings that is there in advance in the recognition of any being. This knowledge is not taken out of beings, but is taught and learned, in view of beings, in view of the fact that they are, which means in view of their Being.

Heidegger summarizes this extended and comprehensive meaning of the mathematical as the concerning with things

insofar as they originate and come forth from themselves, insofar as they are produced by the human hand, insofar as they are in use and therefore stand at our constant disposal—either as a rock or something specially made, and insofar as we have to do with them at all, whether we work on them, use them, transform them, *or* we only look at and examine them with regard to ‘dealing with’, ‘doing’ taken in a truly wide sense (WT, 70).

The mathematical is that knowledge regarding beings that is already present so that we can comport in any way towards the beings of the world, what they are, how they are, what they are for, and all the specific ways in which one encounters and engages beings,

right because one knows about them already, that is, they are already intelligible in view of their Being.

Regarding the original Greek meaning of the mathematical in Plato, Heidegger writes that

The mathematical is that evident aspect of things within which we are always already moving and according to which we experience them as things at all, and as such things. The mathematical is this fundamental position we take toward things by which we take up things as already given to us, and as they should be given. Therefore, the mathematical is the fundamental presupposition of the knowledge of things. Therefore, Plato put over the entrance to his Academy the words: 'Let no one who has not grasped the mathematical enter here!' These words do not mean that one must be educated in only one subject-'geometry'-but that he must grasp that the fundamental condition for the proper possibility of knowing is the knowledge of the fundamental presuppositions of all knowledge and the position we take based on such knowledge. A knowledge which does not build its foundation knowledgeably, and thereby takes its limits, is not knowledge but mere opinion. The mathematical, in the original sense of learning what one already knows, is the fundamental presupposition of 'academic' work (WT, 75-76).

In other words, Heidegger contends the mathematical, for the ancient Greeks, specifically Plato, did not mean only geometry, but the mathematical is that most general knowledge that we already have of beings as beings or as specific kind of beings, that is already present and must be present for any further learning regarding beings to proceed, so that, to be clear and learn about this mathematical is prerequisite for any further learning, for any "academic" work.

The mathematical, being the most general knowledge of beings as beings, or as the kind of beings they are, opens up all that can be learned about them, so that is it imperative that one learns about and reflects upon this basic knowledge because it guides and circumscribes all that can be further known about beings.

Thus, in this sense, the mathematical is the delineation of the Being of beings, the ontological and ontic knowledge of beings, which is presupposed in any knowledge

whatsoever, and thus we need to be clear about this knowledge if we are to proceed in academic work knowledgeably.

The mathematical, in the *mathematical projection of nature*, is that basic understanding of the Being of beings that must be there always operative in all our compartments in advance of our encountering any being, and it is thus that basic knowledge that must be there for modern science to proceed at all, because it is that knowledge that defines the Being of any being, or that defines the Being of specific kind of beings, and in so doing makes them intelligible in view of their fundamental natures, what they essentially are, so that one can proceed to further learn about them, because one knows what they *are*, one knows their nature, their Being.

The mathematical, in this interpretation, is the understanding of the Being of beings in which beings are, what they are to us. The mathematical is that basic understanding of the Being of beings that is always operative in all our compartments, in advance of our encountering any being. It is the ever present basic understanding that allows the field of all that surrounds us, ourselves included, to be rendered intelligible, in the specific determinations in which it does, thus allowing the world to be for each one of us in the way that it *is*.

3.5 The Meaning of Projection in the Mathematical Projection of Nature.

The meaning of “projection”, in the *mathematical projection of nature* is well explicated by the English translators of *What is a Thing?*, Barton and Deutsch who write that “Perhaps the best insight as to what Heidegger means by “project” is Kant’s use of

the word in the Critique of Pure Reason.” They quote that in the *Critique*, Kant writes

When Galileo experimented with balls whose weight he himself had already predetermined, when Torricelli caused the air to carry a weight which he had calculated beforehand to be equal to that of a definite column of water, or, at a later time, when Stahl converted metal onto lime and this again into metal by withdrawing something and then adding it, a light broke in all investigators of nature. They learned that reason only gains insight into what it produces itself according to its own projects...; that it must go before with principles of judgments according to constant laws, and constrain nature to reply to its questions, not content to merely follow her leading-strings (B XIII) (WT, 88-89 note 22).

Barton and Deutsch point out that the German word Heidegger uses for project is Entwurf which

Literally...means 'a throwing forth'; from werfen (to throw) and ent- (indicating separation or severing in the sense of 'out,' 'away,' 'from,' 'forth'). In present day use it is a sketch, and the word 'sketch' is sometimes used in this translation, as well as 'project' and 'projection'. Originally a textile term referring to the building of a frame, in the seventeenth century it (entwerfen) took the sense of a preliminary or preparatory sketch. As Heidegger uses it in SZ, 145 [Being and Time], it is a sketching which is a throwing forth of Dasein in which it 'throws before itself the possibility as possibility and as such allows it to be.' It is through understanding as project that the structure of the being of entities, including Dasein, become accessible. Project is constructive in that it *allows* the possibilities of entities *to be* (WT, 88-89 note 22).

At the beginning of modern metaphysics the casting forth of the creator's emanations which give order to the universe, to the whole and to all beings, in the divine casting of their essence, so that all of its parts can then continue being without any more interventions, recognized as universally valid by his Church, is no more accepted as dominantly true.

Now God is believed to be in that, so Descartes thinks, the human being can conceive of such an entity, and its being able to be conceived lies the possibility of its existence, which indeed it must be, given its presence in the conceiving of the human. Now the Being of beings is to be delineated, that is projected in advance, from the pure thinking of the mathematical present in the human being, that is, by the ontological

thinking which defines, out of itself, things in view of their basic nature.

Now the whole of nature and all natural beings, of history and the human being, is no more to be ascertained from the prescribed texts, reveling the truth from the highest source as interpreted by the schoolmen. Now this whole is to be sought anew, and it must be a conceiving that must reach out and engulf all that which is; a fundamental projecting out from pure reason, mathematical thought, the most general and true propositions regarding the Being of beings and as a whole. And in that the project is mathematical, it must resort ultimately on itself, on the lucidity and self-clarity of its starting points and steps, and how those points and steps are reached.

Now the knowledge of things is no more to be reached as in ancient Greece from the things themselves in the response to the first look of *phusis*, now things, all natural phenomena, must respond to the first look of the mathematical project.

Now knowledge proper is no more an apprehension, in the ancient Greek sense of responding to a call to signify, bringing the world in the open of intelligibility, and the human as the active recipient of this call and the truth as the unconcealment of the being, taking it into custody and preserving it in the work. Now apprehending becomes comprehending, in the sense of “getting” the meaning of something, to get, to appropriate from out of itself, beginning with most comprehensive knowledge of nature as nature, as Descartes puts it, regarding the most basic property that belongs to beings as beings, that is, the essence of things, thus opening the way for the truth regarding beings in all the researches of science.

3.6 The Work of Clarification of the Mathematical by Descartes

For Heidegger it is in the works of Rene' Descartes (1596–1650) that the mathematical character of modern science undergoes its explicit emergence, and the first attempt is made toward its clear articulation. In the transition from the Scholastic understanding of the Being of beings as given in the sanctified Church doctrine, undergirded by the pure reason of the supreme being, the new metaphysical stance leaves God temporarily at the apex but transforms the Being of beings from the Scholastic understanding to the modern one, leaving pure reason, that is, mathematical thought, fundamentally and absolutely determinative regarding the ontological status of beings.

In such a passage, a new foundation is searched for the grounding of knowledge in general, for which the mathematical becomes the new established guideline. That is, the most general knowledge regarding beings is no more referred back to the Aristotelian writings incorporated by Catholicism, in such a refusal Descartes aims to lay anew the foundations for the new building of modern science.

Descartes wants to question the whole, for him erroneous, edifice of the tradition, and build anew a foundation for a new approach, for a new *scientia*, away from the Scholastic established order. Yet the new approach still happens within the previous approach that places pure thought, that which Heidegger denominates as mathematical thought, as predominant, as determinative for any ontological inquiry.

Heidegger contends that the main trait of this search has little of the skepticism, which is usually associate with it, but on the contrary, is possessed by the positive attitude to clarify that which is not clear and thus questionable. In this regard Heidegger writes that it is the passion of the new thought and inquiry to bring to clarification and display in its innermost essence that at first dark, unclear, and often misinterpreted fundamental

position, which has progressed only by fits and starts. But this means that the mathematical wills to ground itself in the sense of its own inner requirements. It expressly intends to explicate itself as the standard of *all* thought and to establish the rules which thereby arise. Descartes substantially participates in this work of reflection upon the fundamental meaning of the mathematical. Because this reflection concerned the totality of what is and the knowledge of it. This had to become a reflection on metaphysics. This simultaneous advance in the direction of a foundation of mathematics and of a reflection on metaphysics above all characterizes his fundamental philosophical position (WT, 100).

Because now the mathematical comes to the fore, Heidegger writes “the principle of all knowledge, all knowledge up to now must necessarily be put into question, regardless of whether is tenable or not” (WT, 103). Descartes is not a skeptic because that is the mark of the proper conduct of the way to knowledge, but because he questions the very core of the meaning of Being in which he grew up. Heidegger contends that Descartes must become a skeptic, that is, “he must become a doubter because he posits the mathematical as the absolute ground and seeks for all knowledge a foundation that will be in accord with it” (WT, 103). He doubts because a new direction urges his thought to articulate a new understanding of Being, and thus he must question everything.

Descartes participates in the slow emerging articulation of the new approach to the Being of being, to the meaning of the truth, away from the Church doctrine yet from within its language and main concepts, which must be questioned and re-thought in view of the emerging mathematical approach to the Being of beings, so that the new impulse can lay out the new solid foundations for modern science.

When the authoritative source of the truth, the truth about what is, is prescribed in the Scriptures, all worldly knowledge must refer back to the hierarchical structure emanating from the supreme being as laid in the Church writings, and their appropriation of ancient philosophy, especially Plato and Aristotle.

Now the emerging of the mathematical projection of what is, of nature, happens in the detachment and the rejection of the knowledge as revealed in the Scriptures, so that all worldly and natural knowledge must be questioned anew. The mathematical projection guides the search for the new foundation, which is to be based on itself, that is, in the new freedom from any authority, that is, a freedom that, as Kockelmans puts it “binds itself only to obligations that are self-imposed” (Kockelmans 1985, 180).

Tracing the arising of modern mathematical science, Heidegger notes that natural science, modern mathematics, and modern metaphysics all stem in such a resolve to do away with the Scholastic tradition and since of these three metaphysics reaches the farthest and deepest, it is within metaphysics, in “First Philosophy”, that the new freedom from the binding of the Catholic tradition is to be resolved.

3.7 Descartes' Etching of the New Order onto the Old One

Descartes, who himself had received his education from the Jesuits, takes up Suarez's major division of Being as infinite being and finite being, and within his *Meditations on First Philosophy* (1641), also known as *Metaphysical Meditations*, further draws the categorization of ens finitus, of finite beings, in res cogitans and res extensa (which will be translated below), the very existence of both relying on the creator God, the infinite substance.

Heidegger points out that still Being is seen from the point of view of the creator and the created in the conceiving and language of late Scholasticism. Yet God's existence, whose existence is ground for all beings, is based for Descartes no more in the faith of the

self proclaimed validity of the Scriptures, but in the conceivability of the concept of God that man can hold without direct evidence. Still within the Scholastic conceptual framework, Descartes now fundamentally questions the way the Being of beings is conceived and grounded, that is, how finite beings, man included, are understood to be. Descartes delineates the incipient mistrust in Catholicism, that is, the modern refutation of it being the grounding of knowledge as such.

Notwithstanding the fact that the impulse toward the new science presses in Descartes, he is a man of his time, he belongs and lives within that tradition, so that the new foundation emerges from such tradition. In such a tradition stretching back to ancient Greece, starting with Aristotle, the proposition, the assertion, provides the guideline regarding the answer to the question of Being. The question regarding the Being of Beings finds its fundamental delineation in the proposition in its basic structure of subject-copula-predicate which discloses and fixes the Being of beings, in the basic determination of their Being, their essence, their nature.

As said above, the Greek term *hupokeimenon*, which refers to beings' presence, as “that which lies before”, that which is present at hand for a possible human encounter, is also understood as that to which all asserting must refer back to, as that-which-lies-at-the-base of all asserting, that is, all the beings that are. *Hupokeimenon* is translated in Latin as *subjectum*, the subject is that which stands at the base of all asserting, at the base of the proposition and to which the predicate must fit, must belong to, as the one essential definition. As Aristotle indicates such definition is so definitive that does not permit to be contradicted. Descartes lives within such a basic approach to the understanding of the Being of beings, that is, that it must happen in the proposition.

Descartes understands the Being of beings in view of the creator infinite being, that is, within the Scholastic definition of beings as created beings, as finite beings; yet he keeps asking regarding that which is the essence of all finite beings, beyond their being finite in relation of an infinite being. Thus he questions regarding the most fundamental essence, attribute, property that fits the nature of beings, the nature of beings that permits beings to be considered as beings.

Descartes finds it in the property of extension, as that which essentially belongs to each thing as a thing. Descartes writes “each substance has only one principal property which constitutes its nature or essence, and to which all other properties are related. Thus, extension in length, breadth, and depth constitutes the nature of corporeal substance....For everything which can be attributed to body presupposes extension” (Descartes in Barbour 2001, 420). Beings as beings are extended, extension is the fundamental property of all things, it is the thingness of the thing, the Being of beings.

The fundamental property of extension answers the question regarding that which is common to all beings as beings, the Being of beings. Now, though, without respect to any authority of the tradition, Descartes must search for the fundamental approach that itself grounds and opens up such an understanding of the Being of beings, that all things as things are extended things. Now, with no already established authority, the question arises regarding the ground whence this most fundamental proposition is to be based upon, that is, the question now concerns the Being as a whole. That is, the onto-theologically structured approach of all metaphysics plays its part in the articulation of the foundation of the new scientific knowledge of all things.

In other words, the question that arises is on what basis is the fundamentally

constitutive proposition regarding the Being of any beings, that beings as beings are extended, to be attained and considered as valid? This decisive search looks for the ground that validates the essence of anything, the fundamental proposition that itself grounds the essential property of all beings as extended. The articulation of this grounding will permit knowledge to proceed properly. This grounding is demanded and must be founded on the mathematical, the mathematical must project nature in its essential definition, and must also account for what grounds this essential definition of all of nature as extended, i.e., the projection that defines the most basic trait of all of nature is itself to be grounded. And this grounding must happen in view of the mathematical, in the ampler sense delineated in Heidegger's interpretation.

Along this search, and because of its scope, that Descartes becomes a skeptic, a doubter. He must find anew the fundamental, absolute and indubitable self-grounding for all knowledge; he must doubt, i.e., question all that is known in order to find a ground that is absolutely certain, that does not leave space for any doubt by the clarity this ground has been achieved, that is, by the clarity of its proceeding.

Heidegger reads in the title of an unfinished manuscript, *Regulae ad directionem ingenii*, Rules for the Direction of the Mind, published fifty years after his death (1701), Descartes' early call to delineate this new pathway. He thus interprets the title's work "(1) Regulae: basic and guiding propositions in which mathematics submits itself to its own essence; (2) ad directionem ingenii: laying the foundation of the mathematical in order that it, as a whole, becomes the measure of the inquiring mind" (WT, 100-101). Without the authority of the doctrine of Catholicism, until then the established path to the true knowledge of the being; a new guiding, a new path must be found, thus a method

becomes critical.

The fourth rule reads “method is necessary for discovering the truth of nature”, Heidegger interprets it to mean that this is “not the platitude that a science must also have its method, but it wants to say that the procedure, i.e., how in general we are to pursue things [method, in Greek in the original], decides in advance what truth we shall seek out in things” (WT, 102).

Heidegger emphasizes that “Method is not one piece of equipment of science among others but the primary component out of which is first determined what can become an object and how it becomes an object” (WT, 102). The fifth rule, the Regula V, reads “Method consists entirely in the order and arrangement of that upon which the sharp vision of the mind must be directed in order to discover some truth. But, we will follow such a method only if we lead complex and obscure propositions back step by step to the simpler ones and then try to ascend by the same steps from the insight of the very simplest propositions to the knowledge of all others” (WT, 103).

Now that the basic knowledge of beings is no more approached from the prescribed path of the doctrine of the Scholastic tradition, then the new approach to knowledge in general is to be delineated by the method that pursues the most basic propositions, the principles upon which knowledge as knowledge is to be founded.

The mathematical is that which sheds light on how beings are to be approached and thus are for us, in the most simple and certain propositions which must be grounded, no more on a higher authority, but on a self-imposed authority, on the clarity of the method with which they are obtained, from thinking itself, from the thinking that is pure, that is, bound to nothing but itself: the pure reason of the mathematical.

The mathematical, in Heidegger's interpretation, pertains with the most general understanding of Being, which first sketches and projects the delineation of the realm of the whole of beings, of nature as nature, of all that which is in general, thus opening all transactions and questioning with beings in the specific and practical ways in which these happen. For Heidegger Descartes' meditations concern the mathematical in this sense.

Heidegger writes that "by way of a reflection upon the essence of mathematics, Descartes grasps the idea of a *scientia universalis*, to which everything must be directed and ordered as the one authoritative science. Descartes expressly emphasizes that it is not a question of *mathematica vulgaris* but of *mathematica universalis*" (WT, 101). In other words, it not a matter to clarify aspects of mathematics and geometry, it is, more fundamentally, to sketch the understanding of Being, clearly articulated in its steps, that sustains the validity of a calculative approach for the knowledge of all nature, to the study of all the objects of nature, in a reach that is to be universal, comprehensive of everything.

Regarding the mathematical, as the ground for a universal science, Heidegger writes that

To the essence of the mathematical as a projection belongs the axiomatical, the beginning of basic principles upon which everything further is based in insightful order. If mathematics, in the sense of a *mathesis universalis*, is to ground and form the whole of knowledge, then it requires the formulation of special axioms. (1) They must be absolutely first, intuitively evident in and of themselves, i.e., absolutely certain. This certainty participates in deciding their truth. (2) The highest axioms, as mathematical, must establish in advance, concerning the whole of what is, what is in being and what being means, from where and how the thingness of things is determined (WT, 102).

In other words, the mathematical is to delineate the fundamental axioms, which as basic principles must lay out the "absolutely certain" foundation for all further knowledge to proceed correctly.

As stated before, in the philosophical tradition of the West, "from where and how

the thingness of things is determined” comes to be grounded in asserting, in the proposition. Heidegger writes that “the simple proposition about the simply present things contains and retains what the things are. Like the things, the proposition too, is present-at-hand...: it is the present...container of being” (WT, 103). But if the proposition for Aristotle must fit the things as they appear to us, thus their appearance is first, now, Heidegger emphasizes, “there can be no pre-given things, for a basically mathematical position” (WT, 103). He writes that only “the proposition, and precisely it must itself be based on its foundation. It must be a basic principle-*the* basic principle absolutely” (WT, 103).

Thus Heidegger writes that “It is a question not only of finding a fundamental law for the realm of nature, but finding the very first and highest basic principle for the being of what is, in general” (WT, 103-104). In that this principle is an asserting, is a proposition, its subject, as the subject of this very first proposition, is such that is paramount to ground all further knowledge.

Heidegger writes that this “underlying subject of the fundamental principle must be such that it first emerges for itself in this original proposition and is thus established”, Heidegger continues writing that “only in this way is the *subjectum a fundamentum absolutum*, purely posited from the proposition as such, a basis...a *fundamentum absolutum* and at the same time *inconcussum*,” that is, “indubitable and absolutely certain” (WT, 103).

In the search for the articulation of such a fundamental and all inclusive ground, that is, the subject of the fundamental proposition for the *mathesis universalis*, the knowledge of all that is, that Descartes becomes a doubter, in the most ample sense

possible, that is, his skepticism must reach everything. The questioning must be all-inclusive; what are beings in the most general sense? Along which path can we reach such knowledge? And on which grounding proposition is this knowledge to be founded?

In refusing the Aristotelian Scholastic tradition, knowledge is no more a matter of arguing in reference to established propositions within the binding of the Church writings; in such a refusal, a new realm must be opened by the most fundamental proposition, in which the subject is that which lies at the base of everything else, precisely in its self-evidence and certainty, and the clarity of the steps taken in establishing the foundation thereof any further knowledgeable proceeding is to be established.

In the freedom opened by such refusal, a self-imposed restriction must assure that only that which is most certain and sure passes and is established as that which is, asserted in the most true and basic proposition. The new approach must be sketched in view of that which is most clear and certain: the subject of the very first principle, so that this clarity, this certainty can open up as valid the further knowledge of everything.

Descartes aims to find the ground of any knowledge, of universal knowledge in the sense of the new scientific science. Descartes searches questioningly for the most certain foundation that can secure the establishing of the new mathematical science of nature. Thus he doubts, he fundamentally questions the ontological status of beings in general, he doubts everything that he had been taught and accepted as true in search for the new basis of the whole edifice of knowledge, which now has to be grounded in the mathematical, as the very base for any knowledge whatsoever. Thus Descartes' questioning must be all inclusive, in that it must find the most secure principle for all

knowledge.

As the famous argument goes, Descartes doubts the very existence of himself, the simple perception of his own body, and the most simple straightforward perception of things, of a piece of paper, in that such perceptions might be happening in a dream state, from which the real perception of the awoken state could not be discerned as distinct (Descartes 1647, 13).

On the other hand, Descartes writes that "arithmetic, geometry and other subjects of this kind, which deal only with the simplest and most general things, regardless of whether they really exist in nature or not, contain something certain and indubitable. For whether I am awake or asleep, two and three added together are five, and a square has no more than four sides. It seems impossible that such transparent truths should incur any suspicion of being false" (Descartes 1647, 13).

Descartes doubts everything that appears to us, the world in the immediacy of its being there for us, and our being there for the world, and in searching for an indubitable ground, he is guided by the absoluteness of the self-evidency of that which is most simple and thus most true as the initial propositions of arithmetic and geometry are.

Descartes considers that if perhaps all that sense perception presents to him, that is, all the things of the world including his body, could not be under all circumstances thought as certain, that it might be just a dream or, as his famous argument goes, all that he perceives could just be the stratagem of a "supremely powerful malicious deceiver" (Descartes 1647, 18) bent on deceiving him about all he perceives. Yet as much as he can be deceived, something indubitable remains, and here he finds what he was looking to find as the ground proposition of all propositions of knowledge.

He writes “I am now seeing a light, hearing a noise, feeling heat. But I am asleep, so all this is false. Yet I certainly *seem* to see, to hear, and to be warmed. This cannot be false; what is called ‘having a sensory perception’ is strictly just this, and in this restricted sense of the term it is simply thinking” (Descartes 1647, 19).

Sense perception might be deceiving, untrue, that is doubtful, as when we look at distant objects and misjudge what they are, yet the knowing that one is having a sense perception is not doubtful, this knowing, this thinking persists under all conditions, this cannot be doubted. Descartes writes “So after considering everything very thoroughly, I must finally conclude that this proposition, *I am, I exist*, is necessarily true whenever it is put forward by me or conceived in my mind” (Descartes 1647, 17).

Descartes doubts everything, he questions the certainty of the existence of the body and of all beings in their very perceived presence: all could be just an illusion, just a dream, yet what remains is the self-knowledge of the one who is questioning, that is, the awareness of oneself having such perceptions.

Descartes is searching for the foundation for all knowledge, a foundation that is to be mathematical, a foundation that cannot be referenced to something else, but must be absolutely certain of itself. This is to be a proposition, most simple and truthfully axiomatic for all knowledge. In the Fifth Replies, published with the *Meditations*, Descartes writes that “in using the word “certain” I am referring to metaphysical certainty, which is the sole issue at this point” (Descartes 1647, 68). For Descartes “Sense perception can be misleading so doubtful, yet there is no doubt regarding that part of the soul, that is, that acts in thinking”; he writes “Thinking? At last I have discovered it – thought; this alone is inseparable from me. I am. I exist-that is certain” (Descartes 1647,

18).

He continues “At present I am not admitting anything except what is necessarily true. I am...I am a mind, or intelligence, or intellect, or reason...I am a thing which is real and which truly exists. But what kind of a thing? As I have just said – a thinking thing” (Descartes 1647, 18). Thus Descartes, guided by the mathematical, finds the ground of any knowledge in the subject of the most secure and indubitable proposition “I am a thinking thing”. This is the first, most certain, and foundational proposition for all knowledge, in Latin *Ego sum res cogitans*.

Heidegger writes “I am, *sum*. *Cogito, sum*-this is the highest certainty lying immediately in the proposition as such. In the “I posit” the “I” as the positer is co- and pre-positing as that which is already present, as what is. The being of what is is determined out of the ‘I am’ as the certainty of the positing” (WT, 104).

In other words, the ground for any asserting was understood in ancient Greek philosophy, as in Aristotle, to be obtained from the things themselves, for example in the coming to presence of form and matter, so that the human psyche co-participates in the knowledge of such fundamental motion which is gathered in the proposition, in asserting, and preserved there. With modern philosophy the proposition as such is still the guideline for the gathering of knowledge, but now the ground for any asserting must be searched anew, that is, in view of the mathematical, “of that which we already have with us”.

What is then this foundational proposition of the *mathesis universalis* Descartes sought, this first principle upon which all asserting must be based upon? Heidegger writes that

This absolutely mathematical principle cannot have anything in front of it and cannot allow what might be given to it beforehand. If anything is given at all, it is only the

proposition in general *as such*, i.e., the positing, the position, in the essence of a thinking that asserts. The positing, the proposition, only has itself as that which can be posited. Only where thinking thinks itself, is it absolutely mathematical, i.e., a taking cognizance of that which we already have. Insofar as thinking and positing directs itself toward itself, it finds the following: whatever and in whatever sense anything may be asserted, this asserting and thinking is always an 'I think.' Thinking *is* always as 'I think' *ego cogito*" (WT. 104).

This is, in Heidegger's reading, the principle that Descartes posits for all modern metaphysics, the subject proper of the fundamental principle, that is, that which is already present in any knowledge whatsoever, in any proposition. The "I am" that is already co-present in any "I think", *ego cogito*, this is the principle, that is, I am is the *subjectum* proper, the subject of the first principle for all knowledge whatsoever.

Heidegger reads this principle as the initial establishing of the new ground, which is arrived at by "fits and spurs". Its essential import is that the subject of the first proposition, of the most certain and basic principle, is whence any knowledge is to be referenced back to, as the mathematical prescribes, that it bases itself on itself. The "I" in the "I think" becomes, as Heidegger calls it, the I-principle, the subject proper for any knowledge. In any "I posit this to be so", as the base of any knowledge, the I think, and thus the I am, are already included and must be co-positing in it. The I am as the subject proper is foundational for any knowledge.

Heidegger writes that

Until Descartes every thing present-at-hand for itself was a 'subject'; but now the 'I' becomes the special subject, that with regard to which all the remaining things first determine themselves as such. Because-mathematically-they first receive their thingness only through the founding relation to the highest principle and its 'subject' (I), they are essentially such as stand as something else in relation to the 'subject,' which lie over against it as *objectum*. The things themselves become 'objects' (WT, 105).

The word object then undergoes an ontological shift, Heidegger writes that
The word *objectum* now passes through a corresponding change of meaning. For up to

now the word *objectum* denoted what was thrown up opposite one's mere imagining: I imagine a golden mountain. This thus represented-an *objectum* in the language of the Middle Ages-is, according to the usage of language today, merely something 'subjective'; for 'a golden mountain' does not exist 'objectively' in the meaning of the changed linguistic use. This reversal of the meanings of the words *subjectum* and *objectum* is no mere affair of usage; it is a radical change of *Dasein*, i.e., the illumination...of the being of what is on the basis of the predominance of the *mathematical*. *It is a stretch of the way of actual history necessarily hidden from the naked eye*, a history which always concerns the openness of being-or nothing at all (WT, 105-106).

Now the human being as the eminent subject is freed by any bond to a higher order of dominance. In this new found freedom the subjectivity of the subject self-ground itself in the purity of mathematical thinking; the *mathesis unversalis* is grounded in the subject, in the "I think", so that the "Being of beings must become thinkable in the pure thinking of mathematics" (IM, 207). Mathematical thought, based on the most certain and basic proposition, the first principle, the "I am a thinking being" takes hold as the predominant approach in which all beings become objects for the subject.

This is the onto-theological inception of modern metaphysics. All beings becomes objects, however their objectivity is articulated, as extended, as mass, as force, as mechanism, resource, this is the Being of beings; and the apex of such ontology stands the theology of the subject, the I-principle, the I am a thinking being.

The onto-theological stance of modern metaphysics of sub-ject and ob-ject allows for Being to eventually becoming open to be conceived as the calculable nexus of forces of modern physics and natural science, and all beings as objects for a scientific approach "set into calculation". Beings are disclosed as objects, produced forth in intelligibility as nature, as physics, as biology, as ecology, etc., domains that, under these metaphysical conditions, as Heidegger puts it, "can be ruled in modern, mathematically structured technology" (IM, 207). This will be furthered articulated below.

With Descartes the subject comes to be the ground for the new science, from now on all beings become objects, that which stand against the subject. During Medieval times all beings were subjects, their subjectivity administered by the creator God, now the human becomes the preeminent being, the sub-ject proper, the base upon which all beings can now become ob-jects. Their Being is not dictated anymore by their being created, but by their being objects to a subject.

This means that their presence, in the here and now, is approached in view of their separation from, and availability to the thinking subject, who posits the Being of beings in the objectivity of objects, as extended corporeality, as shape and position in space-time, thus calculable with mathematical and geometrical formulations.

What really counts here, for Heidegger, is that the Being of objects, their objectivity, is posited by, essentially delineated and produced by the subject.

The essence of human being is no more that of being created and that in such a creation the certainty of its salvation is a stake, that is, the certainty in the otherworldly; the essence of the human lies in the certainty of itself in the mathematical projection of nature, by which the human being can now explicate its own powers to reckon with all beings as objects to be known in a universal, scientific knowledge, thus here, certainty explicates itself in the worldly. A new conception of Being and thus of the human being arises from and against the old one and comes to the fore as the modern age.

3.8 The Axiomatic Character of the Mathematical Projection of Nature as Foundational for Modern Science

The Merging of the Mathematical and the Metaphysical

Within the history of Western metaphysics, the abstract knowledge of mathematics and geometry holds a special place, even as determinative for the inception of modern ontology and for the inception of modern science, as can be found in

Descartes's fondness for his studies in geometry and arithmetic. For example, he writes

I also remember that even before, when I was completely preoccupied with objects of the senses, I always held that the most certain truths of all were the kind which I recognize clearly in connection with shapes, or numbers or other items relating to arithmetic or geometry, or in general to pure and abstract mathematics (Descartes 1647, 45).

Husserl, in the *Cartesian Meditations*, writes that

Descartes himself presupposed an ideal of science, the ideal approximated by geometry and mathematical natural science...Obviously it was, for Descartes, a truism from the start that the all-embracing science must have the form of a deductive system, in which the whole structure rests, ordine geometrico [geometrical order], on an axiomatic foundation that grounds the deduction absolutely. For him a role similar to that of geometrical axioms in geometry is played in the all-embracing science by the axiom of the ego's absolutely certainty of himself, along with the axiomatic principles innate in the ego (Husserl 1977, 7-8).

Along the same lines, Heidegger writes that

we recall in this connection that in mathematics certain highest principles or 'axioms' occur. These highest principles are then equated with major premises in logical deductions, insofar as mathematical thinking thinks in a 'deductively, manner...the principle cogito sum, which Descartes himself singled out as the 'first and most certain,' must be a highest principle and an 'axiom' in the usual sense, the highest major premises, as it were, for all logical deduction (N IV, 118).

In other words, for Descartes knowledge in the most general and proper sense is guided by axiomatic propositions just like the sure knowledge of geometry and arithmetic is itself guided by first and self-evident principles, that is, axiomatic propositions. The grounding for all knowledge since it is to be founded on the mathematical, it must be founded on a fundamental axiom.

But this axiomatic character of the mathematical, Heidegger contends, is not what

is essential, what is essential is that, in that the mathematical comes to define the Being of beings, it comes to play the predominant role as the last stand in the delineation of what is, of Being. Heidegger thus interprets that at the inception of modernity, the metaphysical and the mathematical merge, that is the mathematical surges as that which guides modern metaphysics. The mathematical, in the ampler sense that Heidegger reads in it, merges with the ontological thought that grounds modern science.

As Glazebrook puts it “The mathematical provides a bridge by means of which metaphysical assumptions find expression in science” (Glazebrook 2000, 63). And this mathematical thought looking for its first axiom, finds it in the subject itself, the human being, however the subjectivity of the subject, that is, the essence of the human being comes to be defined, it becomes the ultimate and grounding source of any knowledge. Heidegger writes that “The essence of the fundamental principle now defines itself in and through the essence of 'subjectivity'” (N IV, 118).

On the model of the self-evident certainty of axiomatic, geometrical propositions, and the necessary concatenations of statements which demonstrate the precise position of lines and points and the calculability of their relations, and guided by the essence of the mathematical as the taking cognizance of “what we already have with us”, Descartes brings to a first delineation the modern understanding of Being in the priority of mathematical thought grounded in the subjectivity of the subject upon which the objectivity of the objects is to be based. Human understanding, specifically conceived as mathematical thought, becomes determinative for the Being of beings.

In writing about quantity Descartes in the Fifth Meditations says

I distinctly imagine the extension of the quantity...in length, breadth, and depth. I also enumerate various parts of the thing, and to these parts I assign various sizes, shapes,

positions and local motions; and to the motions I assign various durations. Not only are all these things very well known and transparent to me when regarded in this general way, but in addition there are countless particular features regarding shape, number, motion and so on, which I perceive when I give them my attention. And the truth of these matters is so open and so much in harmony with my nature, that on first discovering them it seems that I am not so much learning something new as remembering what I knew before; or it seems like noticing for the first time things which were long present within me although I had never turned my mental gaze on them before (Descartes 1647, 44).

Here the meaning of the mathematical, that Heidegger retrieves from the Greeks, becomes articulated in the “what I knew before”, that is, what already lies in the I-principle, as the beginning of that which can be thought in clarity, distinction, and self-evidence, as geometrical and mathematical knowledge is regarded to be, in that the subject can say “I distinctly imagine”. Mathematical knowledge in the sense of geometry and mathematics is grounded in the subject of the first axiom of any knowledge, in the “I think”. The mathematical grounded in the subject is the metaphysical foundation of modern science, that is, of universal knowledge, of the knowledge of all the objects of nature.

Guided by the purity of mathematical thought grounded in the I-principle, fundamentally determinative propositions can then to be posited regarding what is most certainly known of beings, such as the property that defines what they are in general, this precedes anything that can be further said of them.

As said before, this fundamental property, Descartes conceives as extension. Beings as beings are extended. The thingness of the thing, the essential property of bodies within space and time, which Descartes coalesces as *spatium*, space, is extension. Heidegger writes “what can be securely reckoned in a being that man himself is not, in lifeless nature, is extension (the spacial), extension which includes both space and time. Descartes, however equates extension and *spatium*. In that way, the non-human realm of

finite being, 'nature,' is conceived and approached as *res extensa*” (N IV, 116).

Thus geometry and mathematics are to be applied in learning about any being, any thing, any body, because extension defines anything as existent, so that the proper knowledge of nature from the general to each specific aspect or domain is to be pursued through the language of mathematics.

Descartes specifically conceives the nature of things as extended bodies in space-time, coalesced into *spatium*, so that the extended shapes of bodies (made intelligible in such ontology of their existence as extended, as to “what they are”) in their positions and in the durations of their movements, are thus to be studied in modern mathematical physical science, that is to say, through the use of mathematics.

The *Meditations* aim to secure the foundation of the mathematical project, to clarify and articulate the understanding of the Being of beings which grounds the validity of the application of analytical geometry, of mathematics to all the questions arising, for instance, regarding the motions of beings, that is, of *res extensa* in *spatium*, as Descartes puts it, that is, the motions of objects in time and space.

The Being of beings is extension, things as existent *are* extended. in view of the onto-theological structure of metaphysics, extension is that which characterizes the existence of things; extension is, in advance, that which is thought in the pure thinking of reason by the I-principle, the I am, whence the projection of the mathematical finds its source. Heidegger specifies that with the diminishing belief in the Christian personal God and its creative power of pure reason, the human surges in its place; yet Heidegger emphasizes that the human does not takes the place of God.

What happens, Heidegger contends, is that the subjectivity of the subject, that is,

how the subject understands itself to be, fills the void left by the lack of faith, the disbelief in the otherworldly and the creative, pure thought of God, and asserts itself as the last stand regarding any determination of any being, and of Being itself, that is, regarding what it means to be, regarding the definition of truth as such, how the truth is to be determined regarding any being.

Now the subjectivity of the subject becomes all determining. Yet the subject does not become God, for the divinity is by definition all knowing, while the human can err and fall prey to distortion and mere opinion. Heidegger writes that

The fact that man can err and so is not in immediate, continuous, and full possession of the true certainly signifies a limitation of his essence; consequently the subject, as which man functions within his representing, is also limited, finite, conditioned by something else. Man is not in possession of absolute knowledge; thought from a Christian point of view, he is not God. But insofar as he does know, he is not simply a nullity” (N IV, 142).

Taking this definition from Pascal that “man is in between divinity and nullity” (N IV, 142), Heidegger contends, Descartes makes it his own.

For Descartes in that man can err, this is both a lack but “also the certification that man is free”, that the human “is a being founded on itself” (N IV, 143). In its limitation of being able to err, then the subjectivity of the subject surges even more as a free, self-determining being, a being whose knowledge is to be found on itself, in the pure reason of the mathematical. The subjectivity of the subject becomes the axiomatic principle for all knowledge.

A new onto-theological stance is articulated by Descartes. Ontology asks regarding the Being of beings, the most common denominator for all beings, “what is indifferently valid everywhere” (ID, 58); theology asks regarding the most Supreme Being “the ALL-Highest” (ID, 58). Ontologically, beings are now extended beings in

space-time, objects; theologically i.e., regarding Being as a whole, the supreme Being is identified in the subjectivity of the subject, that is, the subject essentially conceived as a thinking being, as *res cogitans*. Rational thinking essentially belongs to the human being as such, so that the human being as subject can say that which is, the Being of beings, and from here can pursue the knowledge of the universe, the theory of everything.

The ground of the Being of all beings is the subject, the “I posit”. Heidegger writes "In the 'I posit' the 'I' as the positer is co- and pre-positing as that which is already present, as what is. The being of what is is determined out of the "I am" as the certainty of the position" (WT, 104). That is, in any asserting regarding anything, the “I” in the “I think” is already present to itself, is itself posited as the most supremely in being. The ground of Being is the "I am". Specifically the subjectivity of the subject is understood in the sense that the subject, the I am, is a thinking being: *res cogitans*.

3.9 Being as Representing: the Hermeneutic of the Ego Cogito, Ergo Sum.

The first axiom of modern metaphysics delineated by Descartes is also famously stated as: *ego cogito, ergo sum*. The usual interpretation of this famous passage, considered by Heidegger as the metaphysical axiom for all mathematical scientific knowledge, is “I think therefore I am”; and this seems to clearly signify that since I think I must then be, exist.

But this translation does not convey what Descartes wanted to say. As Descartes himself writes this proposition is not intended as part of a syllogism as the minor premise and its conclusion, the major premise stating that all things that exist think, since I am a

thinking being, therefore I am, I exist (Descartes 1647, 107). Heidegger questions such literal translation. The phenomenological hermeneutic of this foundational moment of the history of Western culture, which will come to dominate the history of modernity, reveals another meaning.

Heidegger interprets that the *ergo* does not mean “consequently”, he writes that “The ergo means nothing more than ‘and that of itself already says’” (N IV, 113). In other words, I am, I exist, and the essential way of my being is that of cogitare, of thinking: I am essentially a *res cogitans*, I am a thinking being. I think and this already says that “I am”; so it is the “I am” that is the major premise “for all logical deductions” (N IV, 113). This is the *axiom* which Heidegger also writes as *cogito sum*. The “I am” is foundational: “I as being” (N IV, 113), the “I am” is the I-principle, the metaphysical ground for all knowledge.

For Heidegger the principle *cogito ergo sum* can be articulated more precisely as *cogito sum*, in this way, the question arises of the specific meaning of the *cogito*, to what it refers to, that is to say, how it is to be understood and thus translated. *Cogito* is usually translated as thinking, not erroneously, yet Heidegger attempts to articulate a more complete meaning of the *cogito*, as the fundamental principle for all knowledge in the modern sense.

The principle *cogito sum* is interpreted by Heidegger as “I am, and essential to my being is thought”, that is, using the modern interpretation of cogito with “thinking”. But what *cogito* comes to signify in the context of metaphysics? Descartes himself asks the question, here in Latin “Quid sit cogitatio? [What is cogitatio?]” He writes (*Principia philosophie*, I, 9): *Cogitationis nomine, intelligo illa omnia, quae nobis consciis in nobis*

fiunt, quatenus earum in nobis conscientia est. Atque ita non modo intelligere, velle, imaginari, sed etiam sentire, idem est sic quod cogitare", which Heidegger translates as "By the term *cogitatio*, I understand everything we are conscious of along with ourselves, everything which occurs in us for ourselves insofar as we have as accompanying knowledge of it in us. And thus not only are knowing, willing, and imagining, but also sensing, the same as what we call *cogitare*" (N IV, 109).

Then *cogitatio* means that I am conscious of all that I know, will, imagine, sense; in that I am I bring all these modalities of my being back to my awareness, that is, I represent to myself all that presents itself in and to my being. Heidegger writes that "In important passages, Descartes substitutes for *cogitare* the word *percipere* (*per-capio*)-to take possession of a thing, to seize something, in the sense of presenting-to-oneself by way of presenting-before-oneself, *representing*" (N IV, 105).

Heidegger emphasizes that "perceptio" can ambiguously mean "bringing-before-itself" and "what-is-brought-before-itself" (N IV, 105). In other words, Heidegger interprets the *cogitare* as representing, and the representing means the thing represented and the representing itself, "the act and its execution" (N IV, 105).

Heidegger writes that "The *cogitare* is always 'thinking' in the sense of a 'thinking over,' and thus a deliberation that thinks in such a way as to let only the indubitable pass as securely fixed and represented in the proper sense. *Cogitare* is essentially a deliberate representing, a representing that examines and checks" (N IV, 106). Thus Heidegger highlights that "every *cogitatio* is essentially a *dubitare* says nothing other this: representing is securement" (N IV, 106). This securement pertains to both the one representing and that which is represented in representing.

In another passage, Heidegger indicates that for Descartes himself *ego cogito* is a *cogito me cogitare*, that is to say, I re-presents to myself that which presents itself to me in perception, feeling, imagining, willing, thinking, and in such representing of the represented I have already established myself as the one representing. Heidegger writes that

For in the human representing of an object, and through the object *as* something standing-over-against and represented, that ‘against-which’ the object stands and ‘before which’ it is presented—that is, the one representing—has already presented itself. It has done so in such a way that man, by virtue of such presenting himself to himself as the one representing can say ‘I’. The ‘I’ in its ‘I am,’ or to be more specific, the one representing, is known *in* and for such representing no less than the represented object (N IV, 112).

In other words, on Heidegger's interpretation, the subjectivity of the subject and the objectivity of the objects are both co-positing in Being conceived as representendness, that is, in the principle “I am a thinking being”. Yet what this principle delineates as the ground for all knowledge is the consciousness that the human has of all that presents itself to the human in perceptions, feelings, thoughts, etc., that is, the principle relates the ground of knowledge as self-consciousness.

Thus Heidegger more specifically articulates that

Human consciousness is essentially self-consciousness. The consciousness of myself does not accompany the consciousness of things, as if it traveled alongside the consciousness of things as its observer. The consciousness of things and objects is essentially and in its ground primarily self-consciousness; only as self-consciousness is consciousness of objects possible. For representation as described, the self of man is essential as what lies at the very ground. The self is sub-jectum (N IV, 108).

In other words, that which stands under, the subject, from the Greek meaning of all beings that stand in presence, and the Scholastic sense of all created beings, comes to characterize the human being as the eminent subject. All beings are objects precisely as standing versus and in view of the subject proper, of the subject as human self-consciousness, which permits the consciousness of that which presents to such

consciousness, opening the possibility for all representing.

Heidegger thus summarizes the meaning of the inceptive principle of modern metaphysics, that is, of modern science, he writes that

At the beginning of modern science stands Descartes' statement *Ego cogito ergo sum*,...All consciousness of things and of beings as a whole is referred back to the self-consciousness of the human subject as the unshakable ground of all certainty. The reality of the real is defined in later times as objectivity, as something that is conceived *by* and *for* the subject as what is thrown and stand over against it. The reality of the real is representedness *through* and *for* the representing subject (N IV, 86).

Cogito ergo sum does not mean I think therefore I am, but means that "the representing I is...co-represented in every 'I represent,' namely as something toward which, back to which and *before* which every represented thing is placed" (N IV, 107). Sub-ject, that which stands under, which before meant all beings, now becomes the eminent subject, in the distinctive sense of the human being as self-consciousness, as the representing subject. The representing subject stands ground for all knowledge as scientific, that is, for all nature as being represented as object. Being is posited as representedness.

Beginning with Descartes the ground of the Being of beings lies in the human subject certainty of its representing. In the fundamental passage from late Scholasticism to modernity, Heidegger highlights that the "essential Christian thought of the certitude of salvation is adopted, but such 'salvation' is not eternal, other-worldly bliss and the way to it is not selflessness", as delineated in the *Doctrina*, but it becomes "the free self-development of all the creative powers of man" (N IV, 89).

Instead of the authoritative revelation that prescribes the way toward the certainty of salvation and all that pertains with it, now the method takes central stage. Method pertains to the "thinking over", the questioning, the doubting of everything in the world,

in the search for what is the most secure and certain and thus properly foundational for the new approach to the understanding of the Being of beings, which opens the knowledge of all things.

Heidegger specifies that Descartes' method, is not yet the method of the "manner of investigating or research" but the search for the way, the sure steps to a definition of Being, "the way to a definition of the essence of truth, a definition that can be grounded only through man's efforts" (N IV, 89). In the fundamental questioning, doubting everything, in the search for what is the most secure and certain in the clear delineation of the steps of the path along which the ground can be attained and secured in the proper steps that leads to it, the human is to rely only on itself. Indeed the ground is *Ego sum, ego cogito*, I am and essential to my being is representing, the thinking over based on my self-consciousness of all that presents to me.

Yet Heidegger emphasizes that this is different from the famous Protagoras' saying, "that man is the measure of all things" (N IV, 90). Heidegger articulates that Protagoras statement lives in the Greek understanding of Being as unconcealment, so that, here man is the one standing in the unconcealment of Being and in such a standing he is open and thus measure the availability of that which presences in such unconcealment, Heidegger writes that "the being-oneself of man is grounded in the reliability of the unconcealed and its radius" (N IV, 95). The human being stands in the restricted radius of presence that is available to each one of us in the openness to the unconcealment of beings, thus their presence is measured by the human. That is, the human being stands within the unconcealment of beings, thus Heidegger writes "man in his selfhood is defined by his belonging in the radius of the unconcealment" (N IV, 122),

and not the other way around.

In this sense, Heidegger writes that “there is no trace here of the thought that the Being as such has to be oriented toward the self-positing ego as subject, that the subject is the judge of all beings and their Being, and that by virtue of the judgeship the subject may with absolute certitude decide about the objectivity of objects” (N IV, 95). With Descartes the subject opens up and decides regarding the objectivity of all objects, regarding presence and absence in the most general sense, that is, “For Descartes, man as self is defined by referring the world back to man's representing” (N IV, 122). In other words, in modernity Heidegger writes “Man comes to be the self-positing ground and measure for all certitude and truth” (N IV, 90).

Furthermore, usually the interpretation of Descartes's *cogito ergo sum* as “I think therefore I am” is placed against the parallel defining interpretation of all beings as extended things; so that all beings are divided in *res cogitans* and *res extensa*, mind and body, the thinking subject and the objects' physical extensiveness. In such a delimitation, there opens up the fissure of the duality of subject and object.

But in relation to this dualism, that Descartes' position affirms, Heidegger stresses the primacy of the unity existing in the enjoining of all that which is, the objective, within the mathematical projection of nature grounded in the subject.

Mathematical representing is not a belief in something one is not sure of, it is the belief in the certainty of this believing: it is the decisive projection regarding the Being of beings and as a whole and regarding the essence of truth, that is, regarding all nature, all objects, and regarding the one who is called to such a task, the subject. The subject engages itself, by abiding to its rational thinking, to say of beings what beings

are as beings: beings become objects that *are* in the certainty of its own project, which provides the guideline to handle and manipulate the objects knowingly in all the researches of the sciences.

When Descartes states the axiom of modern metaphysics *sum res cogitans*, I am a thinking thing, and all things as *res extensa*, the corporeal objects of nature, he does sketch a dual categorization of all finite beings in general. Yet Heidegger emphasizes that “the new delineation of man through the *cogito sum*, as it were, is simply sketched into the old framework of *creator* and *creatum*” (N IV, 117), using the language of Scholasticism, placing the seeming juxtaposition of *res cogitans* and *res extensa* within the old framework, that is, that beings *are* the essence, the whatness, thought out by the pure thinking of the creator. On this model the *sum res cogitans* includes, imposingly, the *res cogitata*, the represented thing, as extended. Heidegger writes that “*sum res cogitans* is the ground, the underlying, the *subjectum* for the determination of the material world as *res extensa*” (N IV, 117).

Descartes still uses the old framework of creator and created when he articulates the new definition of man through the *ego cogito*. Now the “I am a representing being”, *sum res cogitans*, the representing subject and *res cogitata*, the represented things, beings as extended objects are conjoined in the sureness of representing. In other words, Being is no more being-created: Being is being represented, “Being is representedness” (N IV, 116). In the overall sense that the represented thing is gathered back to the subject, itself made secure in this gathering.

Sum res cogitans is not one of the term in the dual categorization of beings, it is the first principle, the very ground, the beginning out of which and to which any

knowledge whatsoever must sprout and refer back to. Heidegger writes that “The principle that lifeless nature is *res extensa* is simply the essential consequence of the first principle. *Sum res cogitans* is the ground, the underlying, the *subjectum* for the determination of the material world as *res extensa*” (N IV, 116).

The essence of all beings is no more thought by the pure reason of the Creator, it is thought out by the pure, mathematical reason of the human. All objects as objects are extended things, posited as such by human representing, within this mathematical projection the Being of beings, knowledge, as scientific knowledge, can unfold.

At the apex of the mathematical project stands the axiom *cogito sum*, which Heidegger unravels as meaning that "I am a being whose mode *to be* consists in representing" (N IV, 115). In other words, in that representing is the essence of the human being, the sure basis for all mathematical representations is the I am. So that after having thoroughly considered all that is available to itself and of all the other beings, the human being represents, that is, it posits, in advance for all further searches, the definition that sketches and thus dictate what the Being of beings is, that is, what is real, and thus knowable. Heidegger writes that "The certitude of the principle *cogito sum*...determines the essence of all knowledge and everything knowable; that is, of *mathesis*; hence of the mathematical" (N IV, 116).

Heralding the slow and steady fading away of the belief in the Christian concept of God, Descartes metaphysics stands at the beginning of modern time as the advancing of human representing as the final judge of the delineation of the Being of beings, of nature and history. Now beings are, that is, their Being is defined only within the human power to enjoin in mathematical representations. Heidegger points that within such

historical, i.e., metaphysical stance, modern scientific man is able to assume the absolutely preeminent role for any knowledge, so that the possibility is opened for the human to lay claim to a domineering role as the master of all nature everywhere, as later shall come to pass in contemporary modern machine technology (N IV, 116).

Heidegger writes that

In the sixth part of the *Discourse on Method* Descartes speaks about the parameters of the new interpretation of beings, especially of nature in the sense of *res extensa*, which is represented as 'shape and motion' (location and mobility); that is to say, which is supposed to be made predictable and thus controllable. The newly structured concepts, grounded on the *cogito sum*, open up a vista whose development the present age is only now experiencing in its full metaphysical absoluteness (N IV, 134).

Thus Heidegger points out that “as unsatisfactory as the interpretation of 'nature' as *res extensa* may be” (N IV, 116), it is the metaphysical import of this new position that matters, in which the first steps are taken in the direction in which, it becomes possible for the human being to eventually become the master over the whole earth through modern mathematical science in modern machine technology.

To summarize, the foundation of modern mathematical science is established in the metaphysical stance that Being is representedness, which grounds itself on itself. That is, the Being of beings is grounded on thinking, which is grounded on itself, in pure reason, in mathematical thought, held by the I think, the I represent, that is, the I am. I think therefore I am, that is to say, I am the representing subject: this is the ground that is mathematical. The ideas, the models, the paradigms of the representing subject come to the fore as determinative for the Being of beings, not randomly and arbitrarily, but right in view of the mathematical projection of nature, of nature as fundamentally calculable.

With Descartes begins the modern metaphysical stance whereby any truth is achieved within the mathematical projection of nature, within the subject's definition of

the Being of beings, that is, the objectivity of objects, however this objectivity is defined, as extended things, or atomic structures, or molecular machines, or fundamental forces. It is within such a fundamental, axiomatic, mathematical representation of all nature as objective, as calculable, that mathematical models can be posited in representing specific phenomena, thus opening up all probing and experimenting in the researches of modern science. And it is in the answers found in the experiments that facts, in the modern sense of the truth, arise.

Facts are wrestled from beings in experiments always within the in advance horizon opened by the subject own positing, its own projection, which defines the Being of beings as essentially calculable. Within the mathematical, both as metaphysical positing and computational approach, beings as objects must be reckon with numerically, with mathematics and geometry through axiomatic, i.e, fundamentally determinative propositions: explanatory theories and mathematical laws, that is, fundamental equations, by which all the events of a natural phenomenon are conceived, and gathered in exact prediction and thus in possible control.

Heidegger contends that it is because of the axiomatic character of the mathematical/metaphysical character of modern science that the experimenting of modern science becomes critical, as will be explicated below.

3.10 The Beginning of Modern Science in AstroPhysics: the Mathematical Conception of Motion in Modern Mathematical Science and Ancient/Medieval Science

How does, specifically, the mathematical projection of nature take place as modern science? In the lecture *What is a Thing? Basic Problems of Metaphysics* given in 1935, Heidegger retraces how the mathematical projection of nature comes to be in the unfolding of the formative beginning of modern science, in astrophysics, specifically in the works of Descartes, Galileo and Newton. Up until then, during Scholasticism, the science of astrophysics, had been based on Aristotle's writings as incorporated in the Church doctrine.

Heidegger emphasizes that the usual argument that modern science succeeds and overcomes ancient/Scholastic science because it is based on observed, that is, experimental “facts” while the former was merely speculative, does really describe the difference between the two.

Heidegger points out that Aristotle's physics is based on observation, it was the corruption and fossilization of late Scholasticism that wasn't. For instance he quotes Aristotle as writing that “To say that which corresponds to what shows itself on what is” and again “knowledge of nature is the unimpeachable evidence of the senses as to each fact” (WT, 81); whereas later Medieval Scholasticism was often concerned with “a foundationless analysis of concepts” (WT, 81). Equally, Newton writes “(*Principia Liber III, Regulae IV*): ‘In experimental philosophy we are to look upon propositions inferred by general induction from phenomena as accurate or very nearly true’ (WT, 82).

Heidegger points out that what separates these two essentially equivalent scientific procedures is that “*what* is actually apprehended as appearing and *how* it is interpreted are not the same” (WT, 82), that is to say, the understanding of the Being of beings of the two is different, what beings *are*, and how they *are*, is different. For both

Aristotle and Newton the truth is in the correspondence of assertions with what and how beings *are*, what changes is the how the “are” is experienced and understood.

Modern science is usually contrasted with ancient and Medieval science in that modern science starts with observation, whereas ancient and Medieval science start with speculative generalizations and concepts. According to Heidegger, this does not relate their real difference. Heidegger indicates that both ancient and modern science deal with concepts and observations, with principles and facts.

Heidegger cites the fact that Galileo's reasoning was criticized by his contemporaries as being “abstract, i.e., it proceeded with general propositions and principles” (WT, 66), the same criticism that Galileo and his disciples levied against Scholastic science. Heidegger stresses that such distinction: here concepts, there facts fails in that “both ancient and modern science have to do with both facts and concepts” (WT, 66). Heidegger stresses that is “the way the facts are conceived and how the concepts are established” (WT, 66), that is decisive for the difference between modern and ancient/Medieval science; it is indeed the matter of different understanding of the Being of beings.

For instance, the monumental shift in understanding regarding the earth's motion in space, as a heavenly body, that is, the discovery of the motion of the earth around the sun, which is considered as the cornerstone of the arising new science, was not based on observation. In this regard, Bortoft writes that “In fact, the observational evidence was not attained until 1838” (Bortoft 1996, 156), even though Nicolaus Copernicus (1473–1543) published his work *De Revolutionibus Orbium Caelestium* in 1543.

This work was spurred by the intention to simplify the traditional scheme of

astronomical computation of Ptolemaic astronomy, which placed the earth at the center of any celestial movement, and which had come to be considered too complicated. Yet, as Kuhn points out, Copernicus' new computations, within the heliocentric system, were not on the whole much simpler or more accurate (Kuhn 1996, 75).

The Aristotelian approach that all movement is understood in reference to the earth as the center of any such movement is based on observation. The Church appropriated it, in the sense that the earth is the center of creation. Aside from such reinterpretation, the Aristotelian approach refers to the very naked-eyed observation that all terrestrial and heavenly movements are observed in reference to the earth itself. Galileo, Descartes contest such a view, but their understanding of movement starts with a conceiving that goes beyond a simple observing in which the phenomenon of movement appears and is.

Furthermore Copernicus' positing of a moving earth was influenced from his reading of ancient philosophers: Heraclitus considered the earth rotating around its axis and Aristarchus (circa 310–230 BC) added the movement of the earth around the sun. Yet for anybody standing on earth, it indeed appears to be standing still. This had Galileo write “I cannot find any bounds for my admiration, how that reason was able in Aristarchus and Copernicus, to commit such a rape on their senses, as in despite thereof to make herself mistress of their credulity” (Bortoft 1996, 155).

Galileo, conceiving a moving earth, understands that when any stone is thrown from a height, the landing spot of the falling stone will still be straight down, because the stone is caught already in the moving field of the moving earth. He writes “Keeping up with the earth is the primordial and eternal motion ineradicably and inseparably

participated in by this ball as a terrestrial object, which it has by its nature and will possess forever” (Bortoft 1996, 163).

Galileo did not reach this true statement by mere sense perception, by the observation of the falling of the ball, such perceiving does not directly and immediately speak of the earth’s movement and the ball’s entrenched conjoining with it, it is the conceiving that illuminates, that renders intelligible the happening, the appearing of the fact, that a ball falls strait down within the field of earth’s movement. What is decisive is “the way the facts are conceived and how the concepts are established”.

3.11 The New Conception of Motion in the Mathematical Projection of Nature

In the lecture *What is a thing?* Heidegger considers the centrality of motion as a basic phenomenon of Being. Heidegger considers that motion is a ubiquitous phenomenon in the general knowledge regarding beings, he writes that “what is, in the general sense of Nature-earth, sky, and stars-is in motion or at rest” (WT, 82). And even more broadly, things move by coming into Being and then sink into non-being. Heidegger then questions what motion is. He writes that “From the general and indefinite experience that things change, come into existence and pass away, thus are in motion, it is a long way to an insight into the essence of motion and into the manner of its belonging to things” (WT, 82).

As articulated above, motion is central to Aristotle's philosophy. Motion in Aristotle is understood in the most ample sense of each entity moving into Being as matter and form, toward the *telos* of itself, the fulfillment of itself as what it is, as the

seed becomes the tree. Now a new thinking arises that disagrees with Aristotle, more precisely the Aristotle that had been appropriated by the Church.

For the Greeks, for example for Aristotle, motion, in the broadest sense, was inclusive of any change, like the turning red of the sun, the ripening of fruits, the specific motion from one location to another, all these relate to the nature of each body by which it strives to reach its place, its “destination”. Heidegger writes that for Aristotle “The body moves according to its nature” (WT, 83), that is, according to what it is, according to the kind of being that it is. For the ancient Greeks, Heidegger articulates, “the purely earthly body moves downward, the purely fiery body-as every blazing flame demonstrates-moves upward” (WT, 85).

In other words, each body moves according to its nature, to the place to which it belongs because of its nature, toward which it strives: the earthly downward and the flaming upward. Heidegger writes that “Each body has *its* place *according to its kind*, and it strives toward that place. Around earth is water, around this, the air, and around this, fire-the four elements” (WT, 83-84). Thus when a body moves toward its place, it moves according to its nature. Heidegger writes that “According to Aristotle, the basis for natural motion lies in the nature of the body itself, in its essence, in its most proper being (*seinem eigensten Sein*). A later Scholastic proposition is in accord with this: *Operari (agere) sequitur esse*. 'The kind of motion follows from the kind of being'” (WT, 85).

Heidegger in retrieving the passage from the Greek sense of motion to the modern one writes that

Motion, in general, is *Motion* [in Greek in the original], the alteration of something into something else. Motion in this wide sense is, for instance, turning pale and blushing. But it is also an alteration when a body is transferred from one place to another... 'Motion with respect to location' [in Greek in the original] means in Greek what constitutes the proper

motion of Newtonian bodies. In this motion there lies a definitive relation to the place. The motion of bodies, however, is *according to themselves* [in Greek in the original] according to them, themselves. That is to say, how a body moves, i.e., how it relates to the place and to what it relates—all this has its basis in the body itself. Basis (*Grund*) is *beginning* [in Greek in the original] and has a double meaning: that from which something emerges, and that which governs over what emerges in this way. The body is *the beginning of motion* [in Greek in the original]. What a *beginning of motion* [in Greek in the original] in this manner is, is *Phusis* [in Greek in the original], the primordial mode of emergence (*Hervorgehens*), which however remains limited only to pure movement in space. Herein there appears an essential transformation of the concept of physics (WT, 83).

At the beginning of modern physics, Heidegger writes “It is everywhere a question of the motion of bodies” (WT, 82), and the basic sense of what motion is, comes to be is experienced and conceived as loco-motion, motion of position in space, no more as the self-emerging of *phusis*, and the moving of beings toward the fulfillment of their essence, what they are.

Modern science takes its first formative steps in astrophysics. It begins with astronomy and macrophysics (the study of physical objects of such a magnitude that can be observed unaided by magnification); and given the ubiquitous phenomenon of movement, there it begins. Beings as objects are extended bodies in space-time and in this realm they move or are at rest. It seems obvious at first that this focus is a proper beginning, yet as Heidegger points out movement means also change, becoming, birth, growth and death. For example, as said before, motion, *kinesis*, in the thought of Aristotle, was, in the most general sense, the coming into being of beings as form and matter, toward what they already are, the seed toward the tree, the child toward the adult, the earthly moving downward, and so on.

The new understanding of motion in general, at the beginning of modern science, is that motion is delimited to loco-motion, that is to say, motion from place to place, but

not only, the Being of beings changes and so the “where” movement happens changes together with how such locomotion is conceived.

To the ancient Greeks, locomotion relates definitely to place, but it is related to the nature of the entity itself which in the moving abides to its own essence, it moves toward its own place. Place, location becomes understood at the inception of modern science, as space, the field of space and time where moving objects can be traced and timed in such movements, as in Descartes who unites space with time in *spatium*. The basic characterization, the essential meaning of motion in the modern scientific sense is that it is restricted to the loco-motion of objects in space-time. Descartes even derides who conceives of motion otherwise.

In this sense Heidegger stresses that the modern understanding of motion in general is a restriction, a shrinking, in respect to the ancient Greek meaning of motion, explicated by Aristotle, in which motion is conceived as emergence first and as change, alteration in the endurance of presence.

At the inception of modern physics, the starting point is the presence of things, which are moving or at rest within space and time. Motion does not relate anymore to the nature of things, now the nature of things comes to be conceived within human representing in its mathematical projecting, thus the essence of beings is conceived anew, and so does their motion. The standard for motion shifts in how motion is fundamentally made intelligible and thus manifest.

Heidegger points out that in the Aristotelian-Scholastic tradition, earth is the center “for all characterization and evaluation of motion”, with the heavenly bodies circling around this center; whereas earthly motion is either “toward or away from the

earth” (WT, 84). On earth, movement is also between two locations, which “is straight” or mixed with the circular. Yet the completely circular motions are first, “that is the highest, and thus, of the highest order” (WT, 84), as in the case of heavenly bodies. In the circular motion the body has its place in the motion itself, that is, the circularity itself drives the motion, “wherefore this motion is perpetual, and really existent” (WT, 84). In rectilinear motion “the place lies only in a direction and away from another place, so that motion comes to an end there”, such a motion is thus “always incomplete” (WT, 84).

In other words, in the ancient/Medieval conception of motion, circular motion is the highest, complete in itself, and perpetual, as it is observed in the motions of heavenly bodies; while terrestrial motion, as a mix of rectilinear and circular has always a beginning and an end, and it is thus an incomplete type of motion.

At the inception of modern science, though, in this fundamental shift of understanding regarding motion, linear uniform motion, either heavenly or terrestrial, is established as the standard for all motions, and all motions are homogenized in view of their calculable positions in space and time.

Heidegger summarizes the main points of such a shift: now bodies move not because of their inner natures, but are moved by outside forces; no distinction is made and no ranking exists between the celestial and the earthly movement; all motion, terrestrial and celestial, linear and circular, are considered in reference to a homogeneous and uniform space time continuum where shifts of location can be traced, and it is everywhere equal. The earth is not the center any more, even though it is the center of our experiences and observations, as we still say that the sun sets and rises.

The old established *ordine mundi*, the ordered cosmos of the Scholastic world

with the earth at the center surrounded by the circling planets, sun included, and the fixed stars circling in definite spheres which delimit God's creation, under the advancing pressure of a new understanding of Being, begins to shatter. Now stars are no more fixed in the spheres of their motions; and the sun becomes a star, among infinite numbers of stars, around which the earth rotates.

Bortoft writes "It was [Giordano] Bruno (1548–1600) who first introduced the idea that the Sun itself is a star, one of an infinite number of stars scattered throughout an infinite space, some of which would have systems of planets like the Earth, where life would flourish" (Bortoft 1996, 166). Bruno speculatively combined "the ideas of Copernicus on the heliocentric universe" with "the subtle vision of Nicholas of Cusa (1401-1464) concerning the infinity of the universe, and the ancient atomistic philosophy of an infinite void populated with freely moving atoms" (Ibid., 166).

It was Galileo who propounded atomism in the work *The Assayer* articulating the new physics in clear contrast to the Aristotelian one and initiating "corpuscularianism" which was directed "to discover the laws imposed by God on the corpuscles at the Creation, which governed their motions, interactions and possible combinations" (Bortoft 1996, 167). In such a comprehensive understanding of motion, and of things as points of mass, all motions are still governed by God, but not through the essence that governs each body in its movements, but with laws. Furthermore the circular standard is replaced by a motion that is straight, that of a corpuscle, with no intrinsic direction because there is no intrinsic center, and whose motion does need a set cause, motion is assumed, guided by laws governing all the possible movements and their permutations and interactions, in the infinite space in which the corpuscle is assumed to be moving.

Now the priority of circular motion is rescinded; linear motion, perpetual and uniform, is the norm. Bortoft writes that

The person who broke with circularity was Descartes's. He seems to have been the first to conceive of inertial motion as being constant motion (i.e., unaccelerated) *in a straight line*. The question is how did he come to this conception, especially in view of the fact that it went against such a long-standing tradition? It certainly was not reached as a result of observation and experiments, as might falsely be led into thinking from the way that science is taught. The prejudice of empiricism is impotent for understanding the discovery of inertial motion-as Herbert Butterfield expressed it: 'In fact, the modern law of inertia is not the thing you would discover by photographic methods of observation-it required a different kind of thinking-cap, a transposition in the mind of the scientist himself' (Bortoft 1996, 165)

Better yet, it required a transposition of the signification of motion as such, and that is to say, that it required another understanding of the Being of beings. Beings do not move according to their essence which guides their motions, their essence is conceived to be extension. Indeed it also required the coming to prominence of the I-ness of the subject as that which underlies all knowledge. It is not just that a new thinking cap comes about, but a new understanding of Being, and thus of the position that thinking itself assumes and of the one who has access to thinking, the human being.

Bortoft details the changing understanding of the nature of things that underlies the difference between the Aristotelian conception of motion and the modern Galilean one, writing that

in order to see that a body is indifferent to its motion, Galileo had come to a further fundamental change in the way of seeing motion itself. He separated the motion of a body from the essential nature of the body, i.e., he saw the motion which a body had as being entirely extrinsic, instead of intrinsic, to the body. Before Galileo, motion entailed the essence of whatever it was that was in motion. Motion itself was considered a special case of change, and change was considered to be whatever it is that is changing becoming more fully itself. Thus a growing plant, the education of a child, and a body falling to the ground were all instances of change in which something comes to be more fully itself. So motion (change of place) was seen as being a *necessary* feature of what it is to be the body which is in motion. For Galileo, on the other hand (and thence for modern physics), there is no such necessary connection between the kind of motion a body has and its

essential nature. A body's motion is contingent to it, hence a body can be indifferent to its state of motion. 'Motion' is now merely a *state* in which the body finds itself (Bortoft 1996, 162).

In that a body's motion is not related to the essence of the body itself, then clearly the body itself must be indifferent to the state of motion in which it happens to be.

In detailing this radical transformation that happens as the inception of modern physics contrasting itself with ancient physics, Heidegger considering Galileo's work, writes that

In the Aristotelian view, bodies move according to their nature, the heavy ones downward, the light ones upward. When both fall, heavy ones fall faster than light ones, since the latter have the urge to move upward. It becomes a decisive insight of Galileo that all bodies fall equally fast, and that the differences in the time of fall only derive from the resistance of the air, not from the different inner natures of the bodies or from their own corresponding relation to their particular place (WT, 90).

Galileo refutes the understanding that the motion of beings is grounded in the beings themselves. He conceives all bodies falling equally fast, their difference in falling relates with their resistance to the air; their falling is equal when air is not present, that is to say, in a vacuum.

Another example could be that of a pendulum. A pendulum is a blob attached to a line with one end suspended and the other fixed, held at some distance from the earth. If in the Aristotelian understanding the pendulum is, that is, intelligibly appears, as the holding back of the bob reaching for its earthly place as it is its nature to do; in the new conception it appears as the constant swinging of the bob in a motion that is perpetual if there were no air's resistance. Again the mere perception of the swinging pendulum does not speak in favor of the first or second, it is the conceiving that interprets the same phenomenon that is decisive, decisive to the way the phenomenon appears, appearing here meaning the intelligible manifesting of the phenomenon.

In considering Galileo's experiment of falling bodies from the tower of Pisa, Heidegger writes that

Both Galileo and his opponents saw the same 'fact.' But they interpreted the same fact differently and made the same happening visible to themselves in different ways. Indeed, what appeared for them as the essential fact and truth was something different. Both thought something along the same appearance but they thought something different, not only about the single case, but fundamentally, regarding the essence of a body and the nature of its motion. What Galileo thought in advance about motion was the determination that the motion of every body is uniform and rectilinear, when every obstacle is excluded, but that it also changes uniformly when equal force affects it (WT, 90-91).

In regard to the Pisa experiment, whose actual happening has been questioned, Heidegger emphasizes that the expected results, that different weights would arrive at the same time, did not happen, he writes that "different weights did not arrive at precisely the same time after falling from the tower," though "the difference in time was slight. This notwithstanding Galileo upheld his proposition" (WT, 90).

In other words, the approach of modern science is not factually based on observation, even though it must start from the phenomena. It is axiomatic in that it takes place through the pro-posing of the law-like propositions that account for the constancy of behavior of certain phenomena, which themselves are already rendered intelligible in view of their posited ontological status. Galileo conceives a new way to approach the phenomenon of motion of all falling bodies, and proceeded to demonstrate such basic delineation of the phenomenon because it was not obvious to all that observed the falling of bodies.

The Pisa experiment of Galileo is then an example of the axiomatic character of the mathematical projection of nature. The axiomatic proposition regarding a phenomenon, that all object fall at the same speed regardless of their "nature", is

proposed, it guides the approach to the phenomenon under scrutiny, making it manifest, intelligible, and thus engageable and available to be set up in the experiment, that is, the axiom is set ahead of any experiment.

In the experiment, the data must conform to the hypothesis, to the axiom, nature's workings must respond within the projected structures of intelligibility of the phenomenon, asserted in the theories and laws claimed by the scientist. In the case of Galileo the in advance proposition proposes that all falling bodies must fall at the same rate “equally fast, and that the difference in time of fall only derive from the resistance of the air, not from the different inner natures of the bodies or from their own corresponding relation to their particular place” (WT, 90).

In order to clarify and bring to relief the fundamental mathematical and axiomatic character of modern science, as delineated above in Descartes' works, Heidegger looks at a passage from Galileo's *Discorsi* “which appeared in 1638, Galileo said: (‘I think of a body thrown on a horizontal plane and every obstacle excluded. This results in what has been given a detailed account in another place, that the motion of the body over this plane would be uniform and perpetual if this place were extended infinitely’)” (WT, 91).

In interpreting Galileo's work as foundational and preparatory for modern science in its mathematical character and axiomatic approach by which the motions of bodies are now understood, Heidegger writes that

In this proposition, which may be considered the antecedent of the First Law of Newton, what we have been looking for is clearly expressed. Galileo says: 'Mobile mente concipio omni escluso impedimento.' ('I think in my mind of something moveable that is entirely left to itself.' This 'to think in the mind' (*Sich-im-Geiste-denken*) is that giving-oneself-a-cognition (*Sich-selbst-eine-Kenntnis geben*) about a determination of things. It is a procedure of going ahead in advance...There is a prior grasping together in this *mente concipere* of what should be uniformly determinative of each body as such, i.e., for being

bodily. All bodies are alike. No motion is special. Every place is like every other, each moment like any other. Every force becomes determinable only by the change of motion which it causes-this change in motion being understood as a change of place. All determinations of bodies have one basic blueprint (*Grundriss*), according to which the natural process is nothing but the space-time determination of the motion of points of mass. This fundamental design of nature at the same time circumscribes its realm as everywhere uniform (WT, 91).

The “I think in my mind of...” exemplifies the mathematical, as the metaphysical stance that sustains modern science, that is, the new onto-theological stance, the new understanding of the being of beings and beings as a whole in the specific emerging of modern physics in Heidegger's hermeneutic of its beginning as modern science.

Summarizing the fundamental shift which happens between ancient and modern science, Heidegger writes that in modern science “Nature is no longer the *inner* principle out of which the motion of the body follows; rather, nature is the mode of the variety of the changing relative positions of bodies, the manner in which they are present in space and time”, and in such a manner they are measurable and “have no special traits anywhere” (WT, 88). The ancient meaning of place, as the specific location to which beings essentially belong to, becomes space, place becomes space “extended infinitely.”

In other words, the ancient Greeks did not experienced the sense of space as in the modern sense of Descartes, as abstract and divisible into coordinates; space for the Greeks is akin to locality, space is the place a beings makes for itself in its own appearing and thus locates itself out of itself, that is, placing itself out of its own being; now space acquires an abstract, idealistic nature, as it is thought for example in a plane extended infinitely.

Glazebrook writes, quoting Heidegger, that “Space is understood as ‘endless, each space-point equal to any other, likewise each direction to any other.’ Time also ‘has

become homogeneous positional order—a scale, a parameter. 'Space and time in modern science are a coordinate system in which objects are located' (Glazebrook 2000, 53).

In light of this new understanding of the basic concepts for motion and body, for space and time, the motion of bodies is made intelligibly manifest and ready to be studied, engaged, researched in modern physics as the space-time determination of the motion of points of mass. Within such a projection motion is not the fulfillment of the inner nature of things, now motion is understood in the lawfulness of motion in space and time.

All phenomena of motion show up within the mathematical law-like formulation of their happening. A distillation not so much of the observation of the phenomena, even if it starts from that, but one based on the new interpretation of motion, and thus of the definition of the nature of things, that is, the interpretation of the Being of beings, out of the *mente concipere*, the I think in my mind of the subject of law-like propositions for all objects' motions.

It is precisely in such “a prior grasping together in this *mente concipere* of what should be uniformly determinative of each body as such, i.e., for being bodily” that exemplifies what Heidegger means by the mathematical character of modern science which he characterizes as the “taking cognizance of something, what it takes being something it gives to itself from itself, thereby giving to itself what it already has” (WT, 92).

In this sentence Heidegger wants to indicate that in understanding the Being of beings, an approach is always already operative in advance, and that now this approach is now grounded in the subject. For the Greeks, for instance Plato, the “taking cognizance

of something” was experienced from the essence of beings themselves available and accessible to a human knowing; in modern times the “taking cognizance of something” resides in the conceiving of the human regarding the essence of things, that is, the in advance approach is grounded in the I-ness, the thought of the subject.

In other words, the approach to the Being of beings of modern science comes to reside in the representing subject whose fundamental insights are first grounded in the participation to the unveiling of the laws of God, but that eventually become grounded in the human, in human geniality.

Thought, more precisely human thought replaces the “emerging of beings” and their gathering in the *logos* (pre-Socratic), or their being-created from the essence thought by God (Scholasticism), as that which is prior to any knowledge. Now “the fundamental presupposition of the knowledge of things” (WT, 75) is grounded in the mathematical projection of nature, that is, in human thought and representation. The subject stands at the base for all the axiomatic propositions of science.

Heidegger acknowledges that modern science is also sustained by the traditional knowledge about beings as developed in the crafts, the practical knowledge of the manipulation of beings for useful purposes, the making and the using of tools. Thus Heidegger delineates a two fold foundation of science “(1) work experiences, i.e., the direction and the mode of mastering and using what is; (2) metaphysics, i.e., the projection of the fundamental knowledge of being, out of which what is knowledgeably develops. Work experiences and the projection of being are reciprocally related to one another and always meet in a basic feature of attitude and of humanly being there (*Dasein*)” (WT, 66).

3.12 The Axiomatic Character of the Mathematical Projection of Nature in Newton's First Law of Motion: the in advance Proposition of the Axioms, the Laws, as basis for the Experiment as Demonstration

In the lecture *What is a Thing?*, Heidegger carries the clarification of the mathematical character of modern metaphysics as grounding for the inception of modern science by interpreting Newton's first Law. This is the first law of motion also known as the law of inertia; this is the original in Latin and translated in English in 1729 by Andrew Motte two years after Newton's death: "Corpus omne perseverare in statu suo quiescendi vel movendi uniformiter in directum, nisi quatenus a viribus impressis cogitur statum illum mutare. Every body perseveres in its state of being at rest or of moving uniformly straight forward, except insofar as it is compelled to change its state by force impressed."

Regarding this law, Bortoft pointedly observes that

Newton makes the claim that this law of motion is based on countless observations and experiments done by others, most notably Galileo. He presents it as an empirical generalization reached by induction from experiments. So we can talk about the 'experimental evidence' for the first law of motion, as if the law had simply been derived directly from experiments...If the law of inertial motion was not discovered empirically as supposed, then neither can it be confirmed empirically by laboratory measurements, because the conceptual elements entailed in it transcend experiment-for example, the notion that motion is a state which a body is in, instead of part of its essential nature (Bortoft 1996, 168).

As articulated above, the understanding of motion which underscores this law is constituted by assumptions regarding the nature of the body in general and what constitute motion in general, that is, mobility in space and time. These are not to be proved, they are accepted as given; they are a new way of understanding the nature of

motion and thus the nature of bodies. So that based on these assumptions, a law is proposed, ahead of any fact, and consequently its validity and veracity is to be ascertain in demonstrations, that is, in the setting up of the experiment. Yet the fundamental concepts were not derived from experiments, indeed such concepts demand and provide the impetus for experimentation, which then becomes necessary.

In this regard, Bortoft writes that

When we think through the fundamental ideas of the science of motion, we discover that they are all intertwined, and therefore that any experimental test which is proposed already presupposes the whole system of concepts. We therefore cannot have an independent test (i.e., independent of the very concepts we are testing) in the way that we believe we would like, although what we can do is to construct empirical demonstrations of the ideas. What are usually passed as 'experiments' in science education are in fact really 'demonstrations' (Bortoft 1996, 168).

Considering the first law of motion in view of the mathematical projection of nature, Heidegger articulates the shift in the intertwined set of basic concepts that fundamentally comprise the understanding of the Being of beings present in such a law.

Now all bodies are equalized, the difference in rank and nature and their respective movements of earthly bodies and celestial bodies is rendered obsolete, the previous asserting “the priority of circular motion over motion in a straight line” changes completely, becoming the opposite “motion in a straight line becomes decisive” (WT, 86). The concept of space is changed accordingly, Heidegger writes that “place is no longer where a body belongs according to its own nature” (WT, 86), but becomes a definable, that is, calculable position relative to other positions. Heidegger writes “Therefore, the determination of motion develops into one regarding distances, stretches of the measurable,...Motion is determined as the amount of motion” (WT, 87).

Now, he writes “Motions themselves are not determined according to different

natures, capacities, and forces, the elements of the body, but, in reverse, the essence of force is determined by the fundamental law of motion: Every body, left to itself, moves uniformly in a straight line” (WT, 87). Bodies do not move out of their own being, but are moved from forces “impressed upon”.

The fundamental feature of beings is no more their essence, but their mass upon which forces act to give them direction, velocity, weight, etc.. Thus Heidegger writes “Thereby the manner of questioning nature also changes and, in a certain respect, becomes opposite” (WT, 88).

For instance, in the Greek understanding of the motion of fall, falling bodies reach toward their resting ground, the earth; the opposite movement, being thrown upward, being contrary to the nature of the earthly rock, is against such nature and thus violent. In the new modern understanding of motion and thus of the nature of bodies, of the Being of beings, the Greek difference between a natural movement and its contrary, violence, disappears. Now all bodies move according to a set of laws, and all motions, all changes, that is all loco-motions are to be accounted for in view of measurable parameters.

In other words, nature is not approached as in Aristotle's empiricism, the more direct experiencing of beings, the observing in the search for, as Glazebrook puts it, “the metaphysical essence and hidden causes arising in immediate actuality” (Glazebrook 2000, 93), in the immediate observing of phenomena; the approach now is to set up the demonstration of the axiomatic proposition, of the law.

In the section of the lecture *What is a Thing?* entitled *The Essence of the Mathematical Project* Heidegger asks

How About this law? It speaks of a body, *corpus quod a viribus impressis non cogitur*, a body which is left to itself. Where do we find it? There is not such body. There is also no

experiment which could ever bring such a body to direct perception. But modern science...that is supposed to be based upon experience...has such law at its apex. This law speaks of a thing that does not exist. It demands a fundamental representation of a thing which contradicts the ordinary. / The mathematical is based on such a claim, i.e., the application of a determination of the thing, which is not experientially created out of the thing and yet lies at the base of every determination of the things, making them possible and making room for them. Such a fundamental conception of things is neither arbitrary nor self-evident. Therefore it required a long controversy to bring it into power. It required a change in the mode of approach to things along with the achievement of a new manner of thought (WT, 89-90).

That is why Heidegger contends that modern metaphysics, and thus modern science which is sustained by it, is idealism (ZS, 226). The ground for knowledge is no more referred directly to the sensible perceivable beings found in experience, as for Aristotle, now the ideas of the thinking subject are projected, in advance, regarding what and how beings are, even if this projection is not readily available in a straightforward sensory perception, though the projection is not arbitrary either, it accounts for how the natural phenomena appear, that is, now within the mathematical projection of nature, within a new understanding of the Being of beings, and thus of the motion of beings. And this is not a critique of modern science; it is the attempt to phenomenologically describe, that is, to interpret modern metaphysics and modern science in their essential features, in the context of the metaphysical history of the West.

In other words, the mathematical projection of nature is not arbitrary, yet is not self evident either. It is the account for what is most common to all beings as beings, by projecting in advance, that is, by sketching in advance the Being of all beings, so beings can be encountered for what they *are*, so knowledge proper, and thus the truth, and no mere opinion, can be pursued regarding all beings, within this specific historical approach.

Heidegger writes that “The mathematical is, as *mente concipere*, a project...of thingness....which as it were, skips over things. The project first opens a domain...where things-i.e., facts-show themselves” (WT, 92). In such a projection what is posited is the “what and how [things] are to be evaluated...beforehand” (WT, 92). In such an evaluation “The anticipating determinations and assertions in the project” are put forth in fundamental propositions: axioms. Therefore, Heidegger writes, “Newton entitles the section in which he presents the fundamental determinations about things as moved: *Axiomata, sive leges motus*, [Axioma, or laws of motion]. The project is axiomatic. Insofar as every science and cognition is expressed in propositions, the cognition which is taken and posited in the mathematical project is of such a kind as to set things upon their foundation in advance. The axioms are *fundamental* propositions” (WT, 92).

The mathematical is the projected understanding, asserted in fundamental axiomatic propositions, that sketches in advance the Being of beings, as Heidegger puts it “the basic blueprint (*Grundriss*) of the structure of everything and its relation to every other thing” (WT, 92). Now the mathematical project establishes the “uniformity of all bodies according to relations of space, time, and motion” in making it possible it requires also a “universal uniform measure” essentially determinative of things: “numerical measurement”, so that, Heidegger writes, “The mathematical projection of Newtonian bodies leads to the development of a certain ‘mathematics’ in the narrow sense” (WT, 93).

Space and time are projected as uniform and homogeneous, a homogeneity and uniformity that can be corresponded by the numerical, that is, the unity of measurements, by numbers and mathematics, by mathematical calculations in the strict sense.

Calculation arises as the way of thinking which is called for to be used in the study of the natural world, within such a mathematical projection, of points of mass moving in space and time.

Heidegger further outlines the basic plan of the mathematical, that is, the axiomatic projection of nature when he writes that “Nature is now the real of the uniform space-time context of motion, which is outlined in the axiomatic project and in which alone bodies can be bodies as part of it and anchored in it” (WT, 93).

Now the motion of natural bodies is no more the motion of beings toward the fulfillment of themselves, the *kinesis* of Aristotle, now Being is accounted for in all beings' motions or their rest in the space/time continuum, in which beings move, that is, are moved by forces, the science of kinetics. Thus the mathematical project pre-determines the nature of space and time, as the within which things move or are at rest, and pre-determines that the nature of things to be points of mass moving in space and time under the influences of forces, calculable in the thus conceived coordinate system of space and time.

The mathematical character of modern science explicates itself in the first axiomatic propositions regarding the ubiquitous phenomenon of motion, within the in advance definition of beings as extended bodies in space-time, moved by force. The first laws regarding motion are the “axiomata, sive leges motus”, the axioms or laws of motion; they are the fundamental propositions for all motions. Yet for Heidegger, these fundamental laws are considered as fundamental “hypothesis” which later might be changed, or overruled, or redefined; what remains is the mathematical projection of nature which reasserts itself in subsequent set of laws, for example in the laws of

thermodynamics, and later of quantum mechanics.

In other words, the laws of motion can and must later be replaced by more reaching ones. Heidegger writes that

the questions about the nature of space and time, motion and force, body and matter remain open. These questions now receive a new sharpness; for instance, the question whether motion is sufficiently formulated by the designation ‘change of location.’ Regarding the concept of force, the question arises whether it is sufficient to represent force only as a cause that is effective from the outside. Concerning the basic law of motion, the law of inertia, the question arises whether this law is not to be subordinated under a more general one, i.e., the law of the conservation of energy which is now determined in accordance with its *expenditure* and *consumption*, as *work*-a name for the new basic representations which now enter into the study of nature and betray a notable accord with economics, with the calculation of success. All this develops within and according to the fundamental mathematical position (WT, 94).

In the progress of modern science, laws and theories can change, yet what remains steady and decisive, Heidegger contends, is the mathematical projection of the being of nature. In other words, Heidegger contends that modern science is the mathematical projecting of nature regardless of how the objectification of nature is articulated; as in classical physics or in the most current physics. The point is that the phenomena of nature are to be accounted for in the calculations of the formulas of the laws, thus accounted for, uniformly and comprehensively, by measuring. This he calls the scientific attitude, which he also calls the theoretical attitude, the theoretical going in advance of all facts within a nature projected as calculable and thus predictable in experimental research.

3.13 The Mathematical Character of Modern Metaphysics Leads to the Experimental Character of Modern Science.

The new approach to the study of motion of modern astrophysics projects an understanding of the Being of beings, that if indeed is to be gathered from the things of nature, it is not gathered, as the usual story about science goes, by the strict observance of what things present to us in the immediacy of their presence, indeed science must start from the observed presence of beings, but this observing right away and in advance happens in view of a new understanding of the Being of beings, the mathematical projection of nature grounded in the *mente concipere* of the *Ego cogito*, that is, by what the subject brings to nature out of itself in its own “*mente concipere*” in the “I think in my mind” in the “I represent”, not arbitrarily, but right in view of its encountering beings.

In this context, Heidegger thus articulates the arising of the experimental nature of modern science from its mathematical character, he writes that

This realm of nature, axiomatically determined in outline by this project, now also requires for the bodies and corpuscle within it a mode of access...appropriate to the axiomatically predetermined objects. The mode of questioning and the cognitive determination of nature are now no longer ruled by traditional opinions and concepts. Natural bodies have no concealed qualities, powers, and capacities. Natural bodies are now only what they *show* themselves as, within this projected realm. Things now show themselves only in the relation of places and time points and in the measures of mass and working forces. How they show themselves is prefigured in the project. Therefore the project also determines the mode of taking and studying of what shows itself, experience, the *experiri*. However, because inquiry is now predetermined by the outline of the project, a line of questioning can be instituted in such a way that it poses conditions in advance to which nature must answer one way or another. Upon the basis of the mathematical, the *experientia* becomes the modern experiment. Modern science is experimental because of the mathematical project. The experimenting urge to the facts is a necessary consequence of the preceding mathematical skipping (*Uberspringen*) of all facts. But where this skipping ceases or becomes weak, mere facts as such are collected, and positivism arises (WT, 93).

In other words, positivism arises from the misunderstanding that theories are “a mere economical description of the facts” (Polanyi 1962, 16). From here the common opinion that modern science superiority to ancient science is based on experimentation

and thus on observation; followed by the other misunderstanding that technologies are solely applications of such observed facts. But as it is now clearly established, facts are theory-laden, that is, facts are always reached within an ontological understanding of the phenomena, the facts are about.

In the attempt to phenomenologically interpret the metaphysics underlying modern science, Heidegger finds the mathematical project. This fundamental metaphysical stance projects in-advance the being of nature, opening up all the domains of nature for human research. The project is mathematical, that is, it stretches in advance and beyond what a straightforward perceiving of nature offers, that is, it projects natural phenomena as essentially calculable; and because of this it must set up experiments, it must set up experiments in which nature must respond in a measurable way. Thus the experimental nature of modern science takes central stage, in the specific sense of setting up measuring instruments to demonstrate the mathematical formulas of the law-like propositions.

The law of motion is based on a fundamental understanding of what motion is for all bodies, all material objects, and thus also upon an understanding of what is the bodily nature of objects, that is, as extended, as points of mass caught in force fields. The ontological definition of nature as the objects that compose the domain of physics, circumscribes the meaning of the corporeality of beings, of their motions, and the forces accounting for it, for all bodies within and outside the earth sphere.

In this context, the insight of the existence of the force of gravity, of the pull of bodies in correspondence with their mass, is not achieved in observation alone and from it exclusively, even if it is steeped in observing and must refer to it; it is an insight that

“skips all facts”, it anticipates all facts, opening the way for all facts. Such a fundamental insight now must find confirmation in the experiment, in the experimental set up dictated by the law-like propositions of physics.

Modern science is based upon fundamental concepts sketching in-advance the Being of beings, that is, what nature is as nature, as in the exemplar case of motion. These fundamental intertwined set of concepts go beyond a mere observing and project, in advance of all observing, a fundamental mathematical re-presentation of nature, really an idealistic model in that it goes beyond what a straightforward perceiving offers, and it delineates the reality of any being to the responses that beings as objects are able to offer to the probing that happens in the experiments, now necessary to demonstrate the mathematical models for each natural phenomenon.

The mathematical projection of nature articulates the understanding of the Being of beings that claims fundamental insights regarding the nature of all natural physical phenomena, regarding all matter and its motions in the formulas modeling such phenomena. Since the ontological projection of a nature so defined is not really provable but allows the establishment of the law-like propositions of mathematical physical science, there arises the necessity for the experiments, for the demonstrations of the law-like propositions.

The fundamental understanding of motion sets up in advance the experiment, in its calculative typology of prediction, that is, opening the possibility for the manifesting of that phenomenon in its intelligible appearing as calculable, and thus demanding that Galileo actually perform such experiment as the fall of weights. The observation of “facts” always lies within a projected understanding, an ontic interpretation of the

phenomenon. And it is always secondary, not as a less than, but in that facts can only be found by an already operative, very general, understanding of the phenomenon in question, which as Heidegger puts it “makes room for them”, for the facts.

How can an understanding of the Being of beings be verified? Heidegger contends, it cannot be verified in experimental procedures, in that all experimental procedures are initiated by such an understanding of the Being of beings, which opens the way for beings to be approached in all experimental proceedings. That is, here are articulated the fundamental assumptions that are to delineate in advance what and how nature is, so that nature can be studied as it is so experienced and conceived to be in such an ontological approach.

In the same way, one can understand nature as an ecological system, and use such understanding to set up certain experiments to answer questions that arises within such an understanding, questions regarding energy flows for instance. But these experiments will not prove, and they do not aim to prove, that nature is an ecological system, they are based on the premise that nature *is* an ecological system. They prove that nature can be understood as an ecological system. The results of the experiments reveal the specific answers from nature understood as an ecological system.

And this is not a lack on the part of experimenting, or ecology, it is the way the human being is, in that it must conceive of beings, in advance, in the way it understands them to be, in order to deal with them, in order to engage them, in order to find them at all, and thus finding them, in the possibility of them *to be* an ecological system, opening the way to learn about specific questions regarding the ecological system.

Facts become possible in view of the fundamental theoretical grasping provided

by basic, that is, ontological concepts, concepts which in advance render the phenomenon under scrutiny intelligible manifest, and thus amenable to be researched in experiments. In this regard, Kuhn writes that “one important aspect of theoretical genius in the natural science” is that “it is a genius that leaps ahead of the facts, leaving the rather different talent of the experimentalist and instrumentalist to catch up” (Kuhn 1977, 194).

The fundamental conception of motion, that it is a linear uniform motion of a point of mass, the model for all motion, and that any body moving uniformly and straight finds rest or acceleration when acted upon by forces, are fundamental propositions whose evidence is not found in the readily available injunction of a mere perceiving, of a mere observing; just like the discovery of the force of gravity or the understanding of space time in their fusion into *spatium*, space, a system of relative coordinates.

These fundamental concepts, far from being solely found in the immediateness of mere perceiving, or derived exclusively from it, are projected in-advance of any experiment and even against the mere perceiving, for example of a moving earth in view of the setting and rising of the sun.

In this sense scientific observing, the specifically focused attentiveness to phenomena under the theoretical attitude, is not a neutral affair of a simple perceiving of what is “there” using the right instrument, but a perceiving or instrumental recording guided, directed by the clarity of the conceptual understanding of its being, its nature, specifically articulated in the axiomatic re-presentation of the phenomenon, that is, the mathematical model and its law-like formulations.

Bacon, Galileo, Descartes are reluctant to trust the senses thus questioning their accuracy, because of the pressing of the mathematical as the new approach to Being,

which has its basis of the primacy of the purity of reason, of abstract rational, self-consistent mathematical thought. The understanding of Being comes to reside in the purity and clarity of the mathematical representing, the representing ground-plan which sketches the essence of nature as a calculable nexus of forces, in advance of any experiment, thus circumscribing the possibility for all experimenting, and really demanding the experiment.

To answer all the questions that arise in the mathematical projection of nature, and since these answers are not available from a straightforward observing of nature, nature needs to be set up in experiments. The answers to such an interrogating are to be measured answers, that is, furnished through calculation, and that means measuring devices, usually the first, essential technology developed in modern science.

In this regard, Kuhn is illuminating, he writes that

Many of the early experiments involving thermometers read like investigations *of* that new instrument rather than investigations *with* it. How could anything else have been the case during a period when it was totally unclear what the thermometer measured? Its readings obviously depend upon the ‘the degree of heat’ but apparently in immense complex ways (Kuhn 1977, 219).

The scientist then, he continues, "had to select for close scrutiny, from the immense multitude of available thermal phenomena, the ones that could most readily be made to reveal quantitative law" (Ibid., 219).

In this sense, Heidegger contends, the rise of modern machine technology is not just related to the application for useful purposes of scientific advancements, but to the mathematical projection of nature. That is, because the mathematical projection of nature “skips” all facts, that is, it skips the ordinary observing of things in that it already observes them in view of an ideal construct, for instance a plane extended infinitely and

balls rolling on it, or a point of mass moving uniformly and straight unless an outside force intervenes, it must necessarily return to the observable, to “facts”, in the experiment.

Within this mathematical projection of nature in its ontological and calculative respects, now questions are posed to nature by science that must bring the theory to a demonstration, and this demonstration must have a numerical answer. Thus the experimental procedure must include measuring devices, that is, nature is to be set up in a controlled environment so that its answers can be measured in relation of the specific questions asked.

In Heidegger's phenomenological hermeneutic of modern metaphysics and science, technology is not just the mere practical application of scientific theoretical understanding verified in facts, but, it intrinsically belongs to the way of proceeding of modern mathematical science to verify its theories in the experiments that must set up nature so it can give a measured answer, that is, through the set up of measuring apparatus.

Technology becomes essential to science because the mathematical approach of science goes beyond what ordinary experience can provide as an answer, and the answer is in advance to be calculable. As Glazebrook writes “Although modern science appeals to the empirical in the experiment, it does not in fact appeal to ordinary experience. Rather, it appeals to an isolated controllable empirical situation. Modern science returns to the empirical only insofar as it separates the empirical from ordinary experience (Glazebrook 2000, 87).

The setting up of the phenomenon in “an isolated, controllable empirical

situation” in which a measuring apparatus measures the answers the phenomenon gives under such conditions begins the process of the emergence of modern technology in which the representation, the modeling of the “working” of a certain phenomenon comes to be “demonstrated”, that is, measured in the constructed apparatus dictated by such underlying understanding, by such model of the phenomenon under study. If the demonstration is successful in the research lab, practical technological applications are soon to be born. In other words, in the process of carrying out, refining, and improving such controlled experiments, their practical, useful applications are never too far away.

Heidegger clearly articulates that what characterizes modern science is not its experimental nature, which supposedly uncovers the bare facts of nature, or its exactness afforded by mathematics. What belongs to the essence of modern science is its going ahead of any facts, to define the nature of reality, the Being of beings, guided by an approach that is calculative to begin with, describing nature in quantifiable basic concepts those of motion, force, mass, heat, etc., so that mathematics must be applied to the study of a nature that has been rendered, in its manifestation, as numerically representable in such fundamental concepts as motion, force, mass, heat, etc.. And whose “workings” can be determined in advance in law-like formulations, which are tested by setting up the phenomenon under study in the apparatus set to control and measure, and thus confirm, the deterministic prediction of the law.

Heidegger contends that modern technology is intrinsic to modern science as the mathematical projection of nature. In other words, nature reveals itself in modern machine technology, because nature has been already opened up as nature by the mathematical projection. So that, in view of what nature is, how nature works can be

attained by the responses nature gives in the experiments, specifically in controlled empirical situations, set up to measure if the prediction of the mathematical formula of the theory corresponds to the measured results nature gives to such probing of the theory, usually through measuring apparatus, that is, through technology. In this way, eventually, modern metaphysics allows nature to be put to work, through its control in technology, which for Heidegger is far away from any simple harnessing of the natural forces of the past.

Heidegger stresses that modern technology is not just the mere application of scientific advancements. More precisely, modern science sets nature up so that modern machine technology becomes the approach within which all natural phenomena comes to be defined and thus *are*, since now their Being, their existence is approached in view of their being represented mathematically, that is, using mathematics, that is, some form of calculation, so that natural phenomena are asked to report themselves to the experimental measuring apparatus, lest they do not exist. In other words, only that which is measurable is real, and the measuring happens through a measuring instrument.

To summarize, from its very beginning modern metaphysics and science avert from the decadence of knowledge to mere verbal argument of late Scholasticism regarding the exegesis of the revelatory texts of the Judeo-Christian tradition and the incorporated texts of ancient Greece, especially those of Aristotle and Plato. It does return to an approach based on experiential observing, but this is not an observing in the sense of Aristotle, for whom even if the knowledge of beings necessitate a predetermined approach, a predetermined understanding of the Being of beings, this knowledge fulfilled itself in the very straightforward sensuous observing of beings, through which more

knowledge of beings can be gathered by the human psyche through the *logos*, in discursive thinking.

At their beginning, modern metaphysics and science, guided by the abstract consistency and certainty that mathematical and geometrical formulations provide, aim to delienate fundamental ontological propositions, axioms, regarding the Being of nature, from, and yet at the same time, beyond what a sensuous perceiving provides, which then guide the specific ways in which natural phenomena are understood to be, so that the mathematical, in the sense of calculation, of mathematics and geometry, is to be applied in order to learn about beings. And since the mathematical projection goes beyond the sensible observing, it must then return to it in the experiement, which together with calculation becomes mandatory for obtaining any truth at all regarding nature.

In other words, the mathematical projection of nature proceeds by establishing fundamental concepts, in axioms, which go beyond the way things show up in a straightforward perception; thus after the positing of law-like propositions, modern science must return to observation in the experiment.

And this is not to say that this is an arbitrary approach, because, obviously, nature so conceived by modern metaphysics and science, responds positively to the investigations of modern science. Heidegger pheneomenological hermeneutic of the inception of modern metaphysics and science aims to clarify how this inception happens in the context of the history of Being, that is, of the historical understandig of Being.

3.14 Phusis Becomes Physics

The pre-Socratic understanding of the Being of beings as the self-emergence of beings in Being, *phusis*, transforms in modernity in Being approached from the knowing capacity of the human in modern physics. Marking the beginning of modernity, Heidegger contends, such understanding acquires the specific configuration which asserts the subjectivity of the subject as the origin of all knowledge, as it is obvious for us today that knowledge is of the objects and yet humanly produced.

Such understanding projects out of itself a framework of basic concepts, of categories, regarding the nature of beings, and in this ontological projection of the mathematical uncovers the workings of nature, thus mathematically conceived in the evolving concepts of motion, matter, force, heat, work, etc..

Modern metaphysics as mathematical is the stance in which human thought and its assertive capacity defines the nature of beings, the Being of beings, in view of them but out of itself, out of thought, out of the purity of mathematical thought.

Thus in modern metaphysics, on the model of mathematical thought, of geometry and mathematics, axiomatic propositions are asserted regarding the Being of beings, by and in the “thinking over” of the subject, the very subject of the first axiom of every knowledge the “I am a thinking being” out of which the Being of beings comes to be grounded and delineated.

The question regarding Being comes to be addressed out of the “thinking over” of the *Ego cogito*, that is to say, *cogito me cogitare*, in human representing. Being finds its final and basic delineation in human representing. The subjectivity of the eminent subject finds its definition in the projective power of thought, of reason, as the power to account for the phenomena of nature in mathematical representations.

The human being is a representing subject, and representation based on the purity of reason becomes the ground for that which is, for Being, as the objects of nature; outside scientific, that is, objective representing, there lies opinions, which in view of the truth that comes to lie in the mathematical, they are really a nothing. All happenings and events that cannot be grasped and reckon with mathematically, and thus quantitatively, become suspicious in terms of what counts, the verifiability of the demonstrations of the representations of phenomena within the mathematical projection of nature.

At the core of modern science stands the self-consciousness of the human in its rational capacity to represent. The human being is explicitly posited as the ground for the true knowledge regarding beings, on the model of the purity of thought of the Christian creator God and the unmistakable self-evidence of the axiomatic proceeding of geometry and mathematics. These secure the binding power of the new way of understanding Being, in which thinking itself, and its mathematical project, pro-poses fundamental concepts that are not based exclusively on observations but on the fundamental, decisive, ontological insights on the nature of all natural phenomena, of the Being of all beings, as extended, as points of mass, as energy fields, that is, as calculable.

Thus modern metaphysics as the mathematical projection of nature grounds knowledge in general in the rational thought of the subject. Mathematical physical science in its first embodiment as modern astrophysics in the two-fold proceeding of theoretical and experimental work replaces Aristotelian astrophysics as interpreted by the Church.

Descartes initiates the overcoming of all metaphysics that is not mathematical, Kant furthers the articulation of the mathematical projection of nature as the modern

answer to the question of Being. Mathematical representing, the scientific attitude then becomes completely unquestioned and thus established absolutely with Nietzsche, as will delineated below.

CHAPTER 4

The Establishment of Modern Metaphysics in Kant's Philosophy

4.1 Heidegger's Hermeneutic of Kant's Critique of Pure Reason

At the inception of modern metaphysics, established in the seventeenth century, in the works of Descartes, the most general knowledge regarding beings is to be established in pure reason by the I-principle, the Ego sum, ego cogito, the I am, I represent. Here the foundational knowledge of beings is posited beyond all the uncertainties, for instance of simple, changing perceptions, thus the foundational property belonging to all beings of nature is posited as extension.

Heidegger considers that in the times of Kant, in the eighteenth century, when the question regards the field of the most general knowledge, this study was called *Metaphysica Generalis* (General Metaphysics). In general metaphysics, the human being guided by pure reason defines that which *is*, in the most general sense, that is, the Being of beings.

It is then from the field of general metaphysics that the knowledge of specific beings, is to be drawn out, out of principles of pure reason, so that the knowledge of *metaphysica specialis*, the metaphysics of specific domains, can proceed, which indeed is ultimately the knowledge that we seek. The domains of *metaphysica specialis* were, at the time, *psychologia*, the study of man, *cosmologia*, the study of nature, and *theologia*, the study of god. That is, here what man, nature, and god are delineated, yet out of the general principles of general metaphysics. Heidegger thus frames the philosophical background for Kant's main work, the *Critique of Pure Reason*.

In other words, to know all the specific beings that exist, a prior understanding of what beings as beings are must already be present, that is, the Being of beings is to be articulated in the most general knowledge, in general metaphysics. It is in general metaphysics that the most general concepts in the form of propositions, the principles, articulate what is common and constitutive to all beings as beings, thus opening the survey of and guidance for all further knowing and studying of all beings. The principles of pure reason thus guide the articulation of what nature as such is, what man as such is, what god as such is.

In this sense, to learn about specific beings cannot happen but in an understanding of what beings are in general. In other words, the naturalness of natural beings is guided, in advance, by the ontological knowledge of beings as beings, by the delineations of general ontology. This metaphysics of the most general knowledge, that is, the ontological truth regarding beings, is to be derived in view of beings but guided in advance by pure reason, the logical consistency of pure reason, which can even step beyond what beings offer to us sensibly in our specific, changing encounters with them.

At the inception of modern metaphysics, the human being takes it upon itself, that is, out of rational thought, to draw the most basic determinations regarding beings as beings, that is, the Being of beings. Of course this happens in view of beings, and even beyond this view. In other words, that beings are considered fundamentally as extended and thus measurable is inherent in beings and yet at the same time beyond our straightforward sensible encounter of them, in the changing appearances and conditions in which beings indeed appear to us. Pure reason as mathematical reason works ahead of all the uncertainties of sensible perceptions and yet it provides in its certainty the guidance

to conceive and articulate in assertions the constitution of the Being of beings that which is most general regarding beings as beings.

In Heidegger's interpretation, Kant concurs with the priority of pure reason, that is, that reason out of itself is capable of defining the Being of beings through the basic concepts of the principles which reason brings out of itself in general metaphysics, but he is dissatisfied by how these principles are justified to provide the most general determinations of beings.

Kant agrees that “this science of the general attribute of all things”, is to be guided by pure reason, by thought; what Kant is dissatisfied with is the lack of justification of how general metaphysics out of pure reason can assert what beings are, that is, what is the justification, the proof, that the principles of general metaphysics relate to the specific realms of *metaphysica specialis*, that is, the realm of nature, of man, of god.

At the beginning of modern, natural science axiomatic propositions, laws, are proposed and then demonstrated in experiments. On the model of natural science, Kant aims to demonstrate how the principles of general metaphysics sustain and make possible the axiomatic propositions of science, that is, the law-like propositions of the mathematical physical science, to provide for the true approach to the knowledge of the totality of the objects of nature.

The demonstration is then not an experiment with objects but, on the model of such experimental demonstration, a demonstration in which the principles of general metaphysics are demonstrated to essentially account for all the objects of nature, as a domain of *metaphysica specialis*. That is, the demonstration is to articulate, in proof, the definition of nature as nature out the principles of pure reason.

Kant aims to render explicit that and how the objects of nature are made manifest, that is, come to be known at all, as for the first time, in view of the principles of ontology, of general metaphysics. Kant's aim is to delineate the ground out of which nature is circumscribed in its Being in such a way that mathematical knowledge is the most appropriate and necessary science of nature; so that axiomatic propositions as laws can and must be projected to account, in truth, for the motions of all nature's objects.

Thus Kant aims to delineate the objectiveness of the objects of nature in its necessary relation to the principles of pure reason, and that is to say, to the subjectivity of the subject. In this sense, continuing Descartes' work, Kant's philosophy lives within the basic rapport of subject and object, indeed it aims to make this rapport more transparent, as the ground for all science.

In articulating the genesis which delienates what modern science is, versus medieval and ancient science, Heidegger reconstructs that what science is, lies not in its use of observation, of experiments, and calculation to reach facts, these were also aspects of the preceding sciences, yet in different ways. And these ways are dictated by the different approach to the Being of beings of each epoch, that is, how the ground of any knowledge whatsoever is conceived.

Heidegger writes that

What is crucial in this genesis lies rather in the fact that Galileo gave a direction to natural sciences by asking...how nature as such must be viewed and determined in advance, such that the facts of nature can become accessible to the observation of facts in general. How must nature be determined and be thought in advance, so that the entirety of this being as such can become accessible to calculative knowledge in a fundamental way? The answer is that nature must be circumscribed as what it is in advance, in such a way as to be determinable and accessible to inquire, as a closed system of the locomotion of material bodies in time. That is, Nature must be *projected* in advance unto its mathematical constitution (PIKCPR, 22).

And Kant, like Descartes, is concerned with this "mathematical constitution".

This is for Heidegger the real sense of the Copernican revolution, and thus of modern science in general, that is, in Kant's words "it is the method of the natural scientist", the light that broke upon the natural scientists when "They realized that reason has insight only into what it produces itself according to its own design [*Entwurf*], that it must not allow itself to cling, as it were, to Nature's apron strings, but must lead the way with principles of its judgments according to permanent laws, and that it must constrain nature to answer its own questions" (KPM, 7).

Kant writes, in the preface to the second edition of the *Critique*, that

When approaching nature, reason must, hold in one hand its principles, in terms of which alone concordant appearances can count as laws, and in the other hand the experiment that it has devised in terms of those principles. Thus reason must indeed approach nature in order to be instructed by it; yet it must do so not in the capacity of a pupil who lets the teacher tell him whatever the teacher wants, but in the capacity of an appointed judge who compels the witnesses to answer the questions that he puts to them (Kant 1787, 19).

In other words, metaphysical knowledge is the knowledge of the approach which in advance with its principles delineates the full scope of the field of nature, so that in this, not arbitrarily projected field, science can ask nature to respond to its own questions in the experiments, that is, respond to the questions opened by this fundamental projection, the delienation of nature as nature, so that, from such lawful formulations of mathematical physical science, it can learn about the facts of nature in the aswers that nature gives in the experiments.

At the beginning of modern metaphysics, the principles for all knowlwdge are to be thought out and proposed out of pure reason, in the clarity of the steps of rational thinking. In other words, the delineation of the principles for all knowledge is prior to the knowledge of the specific objects of nature, in that they open the way things are

understood to be, so the grounding of the principles must be in view of beings but in view of their most general definition as beings, which is guided by the pure, mathematical thinking of reason.

Heidegger writes that

The ‘previously projected plan’ of one Nature in general determines in advance the constitution of the Being of beings, to which all questions that are investigated should be capable of being related. This preliminary plan of the Being of beings is inscribed within the basic concepts and principles of the Science of Nature...Hence, what makes the comporting toward beings (ontic knowledge) possible is the preliminary understanding of the constitution of Being, ontological knowledge (KPM, 7).

This “Science of Nature”, ontology, the most general understanding of nature must not only project this understanding in advance but also account, Heidegger writes, for “a general making-manifest of beings as such” (KPM, 7). How the pure reason of the subject is to essentially relate to the object, that is, how objects are to be understood in view of their coming about in the sphere of that which is knowable, that is, fundamentally accessible to a knowing subject? This pertains with the objectification of beings, that is, what an object is as object.

Under the heading *The Process of Objectification in the Genesis of the Modern Mathematical Sciences*, Heidegger writes that

Galileo's and Kepler's basic achievement consisted in the explicit enactment of the mathematical projection of nature. But what is this other than opening up *that* constitution which constitutes the being called nature, in this sense of a physical and material being as such, i.e., what is this other than opening up the constitution of the being of nature? However, the projection of opening up of nature is disclosing in advance that in terms of which nature as nature should be understood. The mathematical opening and projecting of nature renders explicit and determines as a closed realm that which until then was implicitly and always already meant in every observing, experimenting, calculating, and measuring knowledge of nature. With this projection the ontological constitution of the being we call nature obtains an initial explicit conceptual determination. / It is only when the ontological constitution is explicitly understood and elucidated that the being whose constitution of being this constitution is gets seen in its

proper light. For it is only on the basis of the elucidation of the ontological constitution that the being so determined can be set over against a knowing inquiry *as* the being that it is and become an encompassable and determinable object or domain of objects and thus become thematic. It is only in light of the mathematical opening and projection of nature, i.e. by delimiting [nature] through such basic concepts of body, motion, velocity, place, and time, that certain *facts* of nature become accessible as facts of *nature*. It is only on the basis of disclosing the mathematical constitution of nature that the knowing determination of nature obtains meaning and justification according to measure, number, and weight. / This initial objectification of nature occurs in the mathematical projection of this being, and this objectification of nature constitutes the knowledge of nature as scientific knowledge. What was crucial and consequential about the achievement of Galileo and Kepler was not the observation of facts and experimentation, but the insight that there is no such thing as pure facts and that facts can only be grasped and experimented with when the realm of nature as such is circumscribed. To formulate this the other way around: In each investigation of a presumably pure fact, preconceived opinions about the determination of the field within which the facts are to be found are always already lodged. And facts by themselves cannot elucidate the constitution of being as such (PIKCPR, 22).

Kant aims to define nature as nature in view of the justification of mathematical physical science as the most appropriate course to the study of nature, that is, the articulation of the basic understanding of the objects of nature in terms of which nature can then be studied by modern physics, so that facts about the objects of nature can be obtained. Kant aims to articulate that mathematical knowledge is indeed the most appropriate and necessary kind of knowledge to study nature, that the beings of nature could indeed be addressed and studied with mathematics and geometry as the objects of astrophysics; as it was done by Copernicus, Galileo, Descartes, Newton, etc..

The question that Kant poses is on what foundational ground can mathematical knowledge provide justification that it is to be applied to the study of nature? In other words, how is nature to be understood in general so that mathematical knowledge can and must be applied to the study of nature? In this questioning, Heidegger points out, Kant distinguishes the mathematical, as the metaphysical, from mathematics, in the sense of the numerical and geometrical fields of knowledge.

Heidegger interprets the core of Kant's *Critique of Pure Reason* as the attempt to articulate the metaphysical stance underlying modern science, the ground for the Western modern understanding of Being as mathematical representing. Heidegger interprets that Kant reflects upon

the essence of the mathematical and of mathematics", that is, he distinguishes between "mathematical reason in the narrower sense over against metaphysical reason, i.e., the reasoning upon which a metaphysics, a projection of the being of what is, the thingness of things, must be based; for everything depends on this grounding of metaphysics (WT, 122).

Kant's reflection aims to clarify the metaphysical position upon which scientific knowledge in general is based, that is, the principles of pure reason. Heidegger writes that this "critique of pure reason means to delimit the determination of the being of what is, the thingness of the things, from out of pure reason; it means to survey and project those principles of pure reason upon whose ground something like a thing in its thingness can be determined" (WT, 122). In other words, Heidegger considers Kant a metaphysician since he engages the question regarding the Being of beings or the thingness of the thing.

Ontological knowledge, the knowledge of what a beings as being is, what a thing as thing is, what an object as objects is, precedes in terms of rank the knowing of specific objects or domains of objects, that is, ontic knowledge. The clarity and insightfulness of the ontological knowledge ultimately delimits the scope within which ontic knowledge, the knowledge that is acquired in the positive sciences, can reach. As said above, the positive of the sciences is the forward movement of scientific work out of the ontological positing that defines what beings as beings are, and what kind of beings each sciences studies as its domain.

Heidegger writes that

Ontic knowledge can only correspond to beings ('objects') if this being *as* being is already first apparent [*offenbar*]. i.e., is already first known in the constitution of its Being. Apparentness of beings (ontic truth) revolves around the unveiledness of the constitution of the Being of beings (ontological truth), at no time, however, can ontic knowledge itself confirm 'to' the objects because, without the ontological, it cannot even have a possible 'to what' (KPM, 9).

In other words, ontological knowledge, what in Kant's time was called general metaphysics, in that it clarifies the objectivity of the object, what an object as object is, it allows one to find objects at all, so that it opens up the knowledge by which specific domains of objects, ontic knowledge, can be pursued.

In Heidegger's reading, it is the core of Kant's work to delineate the ontological presuppositions of the mathematical projection of nature, thus sketching the possibility for nature to be understood by modern science as exemplified in modern physics, that is, for Kant in Newtonian physics.

That is, Kant aims to articulate the justification of the validity, the reliability, and applicability of modern mathematical science as that which is normative for all true knowledge regarding nature. This, he does, by demonstrating how the principles of general metaphysics are the guiding principles of the mathematical projection of nature, that is, that they are necessary conditions for any true cognition.

In this demonstration, the composition of human cognition, of human experience proper out of the essence of pure reason is brought to relief. In the justification of such basic conditions for any knowledge, Kant analyzes the inner structure of the conditions of knowledge, that is, of pure reason.

For Heidegger, the mathematical (as in the mathematical projection of nature) is that which must be known in advance of every knowing; the mathematical are the

fundamental presuppositions regarding that which is, the “natural” of nature, which impinges in any human comporting toward beings when the regard is toward their truth. Science does not reach bare, “stubborn” facts, but facts are reached within basic presuppositions, as in the mathematical projection of that which is “natural”.

And since Descartes the mathematical projection of nature has been based upon the pure reason of the subject, upon the principles that reason, out of itself, posits. As said before, this is possible in the transposition of the Scholastic understanding of the Being of beings held in the creative reason of the creator and accessible by the human, to the complete appropriation of pure reason by the human, as originary to itself.

In the passage between Scholasticism and the rise of modern philosophy and science, knowledge and thus how truth is to be properly assessed, is approached still in the Scholastic definition of truth as the correspondence of the proposition with the essence of things as formed by the pure creative reason, that is, thought by God as essences, and open to the one creature who can reason and speak, the human being. The arising and establishment of modernity is the human being's gradual taking into its own explicit task to think the principles, the fundamental propositions of any knowledge, out of itself, out of the pure reason of mathematics which now comes to belong to the human being itself, the subject.

Pure reason is to delineate, out of itself, the essential constitution of knowledge in general, that is, pure reason is to delineate the ground for all possible human knowledge, without any divine intervention. Kant's *Critique of Pure Reason* stands at the very juncture between the beginning of modernity in its final definition away from Scholasticism, away from the understanding of the Being of beings of Catholicism.

Now the truth, in the most general sense, is no more the correspondance of the proposition with the essences thought out by God, now the correspondance is between the proposition and the essences thought out by the pure reason of the human. That is to say, that what beings are as being, is articulated in general metaphysics, and is grounded on foundational principles, the propositions delineating the Being of all beings: what nature as nature is, what man as man is.

Regarding the truth as such, then, Baumgarten, one the leading philosopher of Kant's time, writes that "Metaphysical truth can be defined as an agreement of what is with the first most universal fundamental principles" (WT, 117).

These principles, are the I-principle, the I represent; the principle of non-contradiction, that is, the principle of identity, by which such basic proposition, such as things are extended, cannot be contradicted because of their truth (the identity between the proposition and things); and the principle of sufficient reason, which states that every natural phenomenon has a cause.

These are the principles of pure reason itself, and are based on the inner lawfulness of reason. Out of these principles the decision regarding the Being of beings, about the thingness of the thing is to be reached and established, in pure rational knowledge. This is the background, Heidegger articulates, out of which Kant places pure reason into 'critique' (WT, 119).

Heidegger clarifies that this critique is not to be understood as in the common meaning of finding errors, but in the old Greek meaning of "to sort out", "to lift out that of special" (WT, 119). In this context, then, the Critique of Pure Reason, means to sort out and establish "the most positive of the positive, the positing as what must be

established in advance in all positing as what is determinative and decisive” regarding the Being of any being (WT, 120). That is, “to criticize” pure reason means “to delimit what is decisive and peculiar to its proper essence...a delimit in the sense of an exhibition of the inner construction of pure reason” (WT, 120).

Descartes' *Meditations* find the ground of any knowledge upon the self-evidence of the *ego cogito*, the I represent, as the highest principle, the self-evidence of the sense of self in its own capacity for thought and representing, as in the assurance afforded by the self-evidence concurred by axiomatic geometrical propositions. Out of the assuredness of its own sentience as foundational in its representing of that which is: out of *res cogitans*, the “I think in my mind”, beings are essentially projected and understood as *res extensa*, extended things.

On the model of the creative thought of divine reason, human representing, happening in the thinking self-consciousness of the human and based on the the self clarity of the proceeding steps of reason, is able to assert axioms, fundamental propositions about beings, that which beings are as objects knowable in mathematical representations.

Kant completely concords with Descartes' positing of the principle of the Ego cogito, which he does not question, that is, the grounding of all knowledge happens in human representing, out of thought, out of pure reason. The ground of all knowledge is to be found in the subject and pure rationality.

Pure reason must project the principles of thought as determinative of nature as nature, that is, nature as modern physics. Now for Kant these principles have, not only to be posited, as Descartes does, assured of their veracity by the benevolence of God, but

they have to be demonstrated in their belonging together with the objects of nature in their very manifestation to a knowing subject, so that the mathematical projection of nature can secure its claim of knowledge over all the objects of nature, being them planets, rocks, or chemical compounds, etc.. The task is to articulate the ontological ground of the principles, which permits the ontic knowledge (of specific natural phenomena) gained by the experimental methods of mathematical physical science.

In the *Critique*, Kant aims to demonstrate that the mathematical physical approach to nature is justified, and indeed necessary regarding the knowledge of nature, in view, that is, of the fundamental delineation of nature operated out of the priority of pure reason, which thus accounts for the very appearing of objects. Thus Kant has to delineate the essence, the internal structure of pure reason itself, which grounds, that is, fundamentally connects the axiomatic character of the mathematical to the very appearing of the objects themselves as available to be known securely; so that the application of mathematics to the knowledge of nature is not only justified but necessary.

Kant writes in the *Prolegomena to Any Metaphysics*, “My doctrine is the only means of securing one of the most important Kinds of Knowledge (that which mathematics propounds a priori) to actual objects and of preventing its being regarded as mere illusion” (Kant 1783, 39).

The *Critique of Pure Reason* is to delimit, to bring out a sharper definition of pure reason and its principles in view of that which is, Being, nature, delineated as the sphere of the knowable open to human access out of the principles, that is, the inner composition of pure reason, pure in that it finds its ground on itself.

Thus Heidegger writes that with Kant “the ‘mathematical’ feature of modern

science is retained, namely, to determine in advance out of principles the being of what is. The real effort aims at the formation and grounding of this ‘mathematical.’ The principles of pure reason must be grounded and demonstrated according to their own character” (WT, 122). It is of the essence of these principles that they “they exhibit a basic relation among themselves, belong together uniformly out of an inner unity” which Kant calls a “system”. Kant’s task is then, Heidegger writes, that of “exhibiting and grounding the *System of the Principles of Pure Reason*” (WT, 122).

At the beginning of modern metaphysics the delineation of the principles happens out of pure reason, based on itself, that is, based on the I-principle, the *cogito me cogitare*, the rational subject, out of whom pure reason is to establish the very basic concepts posited as foundational for the being of all things: the categories are indicative denominations that conjure beings in their intelligible presence as what they are essentially, that is, for Descartes, as *res extensa*, extended things, thus providing also guidance to the articulation of the other concepts of the phenomena by which these are engaged and studied, such as space, time, mass, weight, motion, velocity, etc..

The most fundamental categories, the basic concepts by which the Being of beings is made manifest, originate from the rational mind of the human being, from the ground of all knowledge, that is, the I-principle: the human being as the one creature capable of thought and language, of rationality.

The human is the one being who can think and say that which is true regarding beings in judgments (propositions, assertions) in view of these thought forms, that is, out of basic categories, basic ideas. These are not arbitrary, but belong generally to all beings, in that the categories are not to be taken from the straightforward sensual

perception of things, which can be faulty or uncertain, as Descartes puts it, but from the pure, that is, unconditioned capacity of the mind to reflect, and thus find the most sure property belonging to all things, that is, what makes a thing a thing, the thingness of the thing. As extension is posited to be.

Extension is the most essential property which belongs to beings, posited by the I think beyond all doubt, beyond all the permutations and transitoriness of perceptions, by which one can indeed assess all the transitory states which beings, like a candle, presents to us.

Thus rational metaphysics stakes the priority of the approach to the question of the Being of beings on thought itself, in its purity, its self-consistency and clarity. On the model of Catholicism and the rising of mathematical and geometrical thought, the articulation of the Being of beings is approached from the exemplary model of the purity, that is, the unconditioned creativity of thought; and the self-evidence, consistency, and surety of mathematical propositions.

The Being of beings is grounded in the purity (that is, untainted by any doubt that can be brought in reflection to bear on it) of thought by which human representing articulates in the judgment, in saying, in logic statements, the fundamental propositions for all knowledge: principles-such as the I-Principle, the *ego cogito*; the principle of identity that does not allow contradiction (the principle that things as things are extended); the principle of sufficient reason, that every natural happening has a cause.

Thought defines the Being of beings through the pronouncement of fundamental principles. Thus the propositions of pure reason is where, firstly, the truth about objects is to be asserted through basic concepts, the categories. It is here then, from general

metaphysics, that the clarification of the most general knowledge of beings guides the knowledge of specific kinds of beings.

At the inception of modern metaphysics, the *Logos* as Pure Reason is whence knowledge, in the proper sense, is to be grounded. Pure reason, which brings to intelligible manifestation beings as objects, is pure also in the sense of being untainted by the uncertainty of sense perception. Indeed the knowledge of the objects of mathematical physical science, are not grounded in "straightforwardly observant apprehension" (BW, 80), but they are objects which defies their sensible manifesting, such as balls rolling on an indefinitely extended plane, unless a force intervenes, or planets orbiting because of the gravitational forces: these are the objects of Galileo's, Descartes', and Newton's scientific studies. These manifest the beings of nature, make them intelligible present within mathematical thought, that is, the mathematical projection of nature.

Thus modern scientific knowledge is grounded and thus can properly proceed out of principles, axiomatic propositions, that is, from the in advance mathematical projection. This ontological thought regarding the nature of things skips any consideration, even if must start from it, over the most simple, basic sensible apprehending of beings, which becomes dubious, but is based on basic concepts out of pure reason, pure thought based on itself.

Heidegger interprets that after this skipping over what manifests sensibly operated at the inception of modern metaphysics, of the mathematical projection of nature, based exclusively upon the clarity and purity of reason, that is, the establishment out of itself of axiomatic propositions, which grounds the subsequent experimental demonstrations, i.e., the facts of science, Kant, reflecting upon this projection, finds that when one asks how

can science proceed out of pure reason so successfully, that is, how it articulates and justifies the validity of its own approach to nature in general before any experiment is carried, it fails to come up with an answer, and that for Kant means a demonstrated answer.

Kant, still in view of his high esteem of mathematical knowledge, answers this question in the direction in which the *aesthesis*, the sensible showing of beings, perception, is to be brought into explicit consideration when the ground of knowledge in general, that is, of general metaphysics which grounds mathematical physical science, is to be fundamentally questioned and assessed in view of its ground, pure reason, from here then the *Critique of Pure Reason*.

For Kant the matter of metaphysics is not just to posit the principles for all knowledge in general as ground for mathematical physical science, but to demonstrate how the principles relate to the beings of nature in their sensible manifesting, so as to demonstrate how mathematical physical science, as the knowledge of the beings of nature, is possible in the first place, in the fundamental sense of its relation to the very manifestation of the beings of nature, in the way they essentially appear to us, sensibly, “with regard to our *intuition*”, which for Kant means the sensible perception of them. So that the mathematical physical science of Newton, which Kant considers the highest knowledge, is grounded in the justification, that is, in the proof that the mathematical projection and its principles are the proper beginning to the true knowledge of nature, that is, to scientific knowledge.

Thus the principles of the ontology of nature, the sketching of the sphere of what is knowable, are not only to be posited, as ground for the law-like propositions of modern

science, this ground has to be proven, and this proof must consist in the articulation of the originary relation of pure reason, sensible perception and nature in general. This proof then validates the scientific approach in all the domains of nature, above and beyond the successes of modern mathematical science.

4.2 The Demonstration of the Inner Unity of Pure Reason as Perception and Thought: the Return of Perception as Foundational, Together with Thought, for any Knowledge in Kant's Critique of Pure Reason

In Heidegger's phenomenological hermeneutic of the history of Being, modern metaphysics (usually called rational metaphysics) arises through the transposition of the creative, unconditioned thought of God of the Scholastic tradition, to the pure reason grounded in the human subject. The Being of beings is circumscribed from the clarity that reason, out of itself, can attain in representing, that is, in mathematical representing, thus establishing the sure method to true knowledge of the world in the basic concepts with which things are to be understood and thus engaged in scientific research.

Heidegger writes that, since Descartes, “pure reason has been established as that by whose guideline all definitions of what is, the thing, are to be made in rigorous proof and grounding”, that is to say “a sketch of the being of what is” (WT, 116). That is, the Being of beings is to be delineated by pure reason as ground for the mathematical physical science, the scientific knowing of natural phenomena. In the *Critique of Pure Reason*, Kant reconsiders the priority of reason of rational metaphysics in which, as

Heidegger writes, “the pure inner lawfulness of reason, from out of its fundamental principles and concepts, decides about the being of what is, about the thingness of things” (WT, 118).

To be clear, Kant's philosophy retains such priority and moves within such a fundamental approach, in that it aims at the explication of the principles of the categories of pure reason by which the thingness of the thing is determined; but it demands a demonstration and thus a clarification on how the priority of thought, of the principles, being prior to the objects of nature, pertains fundamentally to the knowledge of the objects encountering the human subject, that is, of beings standing there, appearing as themselves against and separate from a subject. The benevolent role of God is not invoked anymore to assure the correspondence of the axiomatic propositions to the things, this assurance must come from the clarity of the steps, methodologically, in demonstration.

As said before, the method is now necessary because the highest authority regarding the understanding of the Being of beings lies in the intellectual capacity of the human, in the highest principle, the I-principle, the *ego cogito*, the I represent. The understanding of the Being of beings is arrived at by meditation, that is, by the *Meditations of First Philosophy*, and not anymore by interpreting a prior revelatory disclosing of the essence of things, as in Scholasticism.

In the *Critique*, thought as pure reason is now called pure understanding, that is, it is still pure, that is, based on itself as foundational for all further asserting, it is prior to all asserting. But not only, now the pure understanding must be demonstrated to pertain fundamentally to the objects standing outside the human subject, to the sensual appearing

of objects themselves.

In such a new delineation of thought, pure reason, pure understanding, is delimited, is restricted to its essence in the articulation in which the sensible encountering of beings, perception, which Kant calls intuition, the sensory character of human knowledge, must also be accounted for, for the proper grounding of knowledge in general, that is, of any knowledge whatsoever.

Heidegger contends that in the *Critique* Kant aims for a sharper articulation of rational metaphysics, and in so doing brings about the overcoming of rational metaphysics. Heidegger writes that rational metaphysics “put the essence of knowledge into pure reason into mere conceptual thought” (WT, 146); Kant, on the other hand, “posits intuition as the supporting fundamental moment of human knowledge” (WT, 146), so that ultimately this positing brings intuition, that is, perception, in a position of “authority without which thought is nothing” (WT, 146).

In the *Critique of Pure Reason*, Kant, attempting to delineate in demonstration the base for all knowledge, operates such delimiting in which pure reason, that is, pure understanding, is founded upon intuition, and precisely on “pure” intuition. Pure here means, Heidegger writes, “unencumbered”, “being free from something else” (WT, 147). That is, pure intuition, as Heidegger puts it, means “free from sensation, although it is an intuition that belongs to sensibility. ‘Pure’ therefore means what is based only upon itself and existing first” (WT, 147), that is to say, laying as the ground, as the condition for intuition itself, that is, for all intuiting, for all sensible perceptions.

Ultimately then the *Critique*, Heidegger contends, positions “thought in the service of intuition” so that “correct thought is always based on intuition” (WT, 147).

Heidegger writes that “If correct thought is always based on intuition, then the proper logic belonging to this thought necessarily and precisely deals with this essential relation to intuition, consequently with intuition itself” (WT, 147).

Heidegger writes that now the “question of the principles of the *pure understanding* is the question of *the necessary role of intuition, which necessarily is the basis for the pure understanding*” (WT, 147). So that, he continues, “the determination of ‘pure understanding’ can only mean understanding based on intuition and, indeed, on intuition that is pure” (WT, 147). The critique of pure reason then means that pure reason is delimited to its inner structure; reason, Heidegger writes, is “limited to its essence, it means reason...is grounded in pure intuition and sensibility” (WT, 148).

Heidegger writes, quoting Kant, that Kant's ground plan is

to outline the *architectonic* of all knowledge arising from *pure reason*; and in doing so we shall begin from the point at which the common root of our power of knowledge...divides and throws out two stems, one of which is *reason*. By reason I here understand the whole higher faculty of knowledge and am therefore contrasting the rational with the empirical. The 'empirical' here signifies the experiencing taking things in stride: receptivity, sensibility as such (KPM, 26).

When the ground for all knowledge is sought, this ground still belongs to pure reason, that is, pure understanding. But this pure understanding must now be essentially related to sensible perception, to “sensibility as such”, to pure intuition. This new fundamental positing is carried out in the *Critique*.

Thus Kant's work still resides in the tradition that posits knowledge to be founded on principles-axiomatic propositions of thought, in the asserting of fundamental concepts, the categories. Kant aims to demonstrate the very constitutive interrelationship of thought, of logic (to state regarding objects in view of the categories as the fundamental

determinations of the objects) and intuition, perception, the perceptive capacity of the mind, that which is given in the appearing of the objects through the senses. This is the fundamnetal architectonic of all knowledge. The ground for knowledge proper lies in both pure perception and pure understanding.

The manifold of that which appears and presents itself and is taken in sensibly, in perception, comes to intellegibility in the categories; both moments residing in the rational, mental power of the human, in the unity of the self-consciousness of the human. In the *Critique*, Kant writes that “All sensible intuitions are subject to the categories, which are conditions under which alone their manifold can come together in one consciousness” (Kant 1787, 185), that is to say, in the cosnciousness of the human being.

The metaphysical grounding of knowledge proper, of modern mathematical science, the realm where truth is to be ascertained, must now explicitly include, refer to, and account for the appearing of beings in perception, as the objects of possible mathematical knowledge. Pure understanding together with pure perception compose the inner structure of the knowledge regarding that which is, regarding all objects, regarding the objectivity of objects, that is, the Being of beings.

4.3 The Components of Pure Reason as Human Knowledge

The Spontaneity of Thought and the Receptivity of Sensibility

How does then Kant structure the specific delineation of this interrelationship of thought and perception, which grounds mathematical physical science, and which for

Kant is human experience in the proper sense?

Specifically, Kant defines perception as a reception, as a taking-in of something given; in this regard Heidegger writes “in intuition what is represented is pre-sented as object, i.e., the representing is a having before oneself what encounters” (WT, 142). This encountering happens in that perception is “directed toward something already given” (WT, 143). The “given” are beings outside the subject that are intuited through the senses, they are received sensibly, in perception. Whereas thought is spontaneous in that, Heidegger writes,

the behavior of the conceptual representation is such that the representing from itself compares what is variously given, and in comparing refers them to one and the same and seizes this as such. In comparing spruce-beach-oak-birch we bring out, seize, and determine what these have in common as one and the same thing: 'tree'. This comparing unfolds from itself so that it is spontaneous (WT, 143).

Furthermore Heidegger writes

in thought, in the concept, what is represented is such that we ourselves fashion and prepare it in its form. ‘In its form’-this means the *how* in which what is thought (*das Gedachte*), what is conceptually represented, is something represented...in the *how* of the universal...On the contrary, the *what*, e.g., the ‘tree-like,’ must be given in its content (WT, 143).

In other words, perception is the reception of the manifold of sensual impressions of each specific being, for instance, the individual trees, but the concept tree, the category under which all tree can be subsumed, is fashioned spontaneously out of the mind, by comparing, in reflection. So that in intuition is represented the immediate particular, in thought the mediate universal. Heidegger writes that “the former relates immediately to the object and is single; the latter refers to it mediately by means of a feature which several things can have in common” (KPM, 16).

For Kant knowledge in general happens in the two stems of intuition and thought.

Neither thought nor intuition alone can provide knowledge of the object. Yet intuition, perception is, Heidegger stresses “the really sustaining and immediate relation to the object” (WT, 135). Yet if intuition is immediate relation to an object, as the straightforward perception of individual things; thought, brings the universal concept mediatively, in reflection, that is, it is mediate. As Heidegger puts it “concepts are not immediately found in advance (*vor-gefunden*). A certain way and means is necessary to form them, therefore, thinking is mediate representing” (WT, 137).

Now the approach to the question of the Being of beings is to be drawn not from concepts alone, but from the coming together of thought and intuition, that is, perceiving. What is at stake here is the ground for all cognitions, the *Critique of Pure Reason* yields the inner constitution of any knowledge: it is not a matter of pure reason alone, but of its inner constitution pure reason in pure understanding and pure intuition.

In the *Critique*, Kant writes

Let us give the name *sensibility* to our mind’s *receptivity*, [i.e., to its ability] to receive presentation insofar as it is affected in some manner. *Understanding*, on the other hand, is our ability to produce presentations ourselves, i.e., our *spontaneity* of cognition. Our *intuition*, by our very nature, can never be other than *sensible* intuition; i.e., it contains only the way in which we are affected by objects. *Understanding*, on the other hand, is our ability to *think* the object of sensible intuition...Without sensibility no object would be given to us; and without understanding no object would be thought. Thoughts without content are empty; intuitions without concepts are blind...it is necessary that we make our intuitions understandable (i.e., that we bring them under concepts)...The understanding cannot intuit anything, and the senses cannot think anything. Only from their union can cognition arise...Hence we distinguish the science of the rules of sensibility as such, i.e., aesthetic, from the science of the rules of the understanding as such, i.e., logic (Kant 1781, 106-107).

Knowledge in general is articulated in the coming together of sensibility, the aesthetic, and understanding, the logic, which, both being foundational, must be pure, that is, unconditioned. What makes experience as such is the coming together of pure

understanding and pure intuition. If sensibility as such permits the receptive sensory impressions to be given, then the spontaneity of thought, of the understanding, brings to the stability of intelligibility all sensible impressions in the categories, thus permitting the possibility of cognition in the general and proper sense.

4.4 Absolute Knowledge Becomes Human Knowledge: the Human Faculties of Perception and Thought

With Kant knowledge is no more knowledge out of pure reason alone, and so in this sense a knowledge that is absolute, as based on the purity, on the priority of thought. Heidegger writes that knowledge in general for Kant it is no more “a knowledge in an absolute sense” (WT, 133). But a knowledge that is human, circumscribed in what is available to the human, in other words, finite. The spontaneity of thought and the receptivity of perception provide the ground for the knowledge available to the human being.

To clarify, Kant calls *intuitus originarius*, originary intuition, the divine intuition in whose intuiting any thing comes to be and known immediately; it is intuited and known at the same time, this is absolute knowledge. This is the ground for the thing in itself that is given for human knowledge. But this “thing-in-itself”, this originary intuition, Heidegger writes “remains hidden from every finite intuition insofar as this [finite] intuition does not first produce [things] and put them in place” (PIKCPR, 68).

In other words, the thing intuited, that is, perceived, the human did not make, it is

present before us, given from an ordinary act of creative divine knowledge. So that the same thing when looked upon, that is, perceived by the finite human looking and perceiving, it is *intuitus derivativus*, derivative intuition, which necessitate another step, thinking, so the thing can be properly known, this is the knowledge available in human cognition.

With Kant knowledge is delimited, explicitly, into a knowledge that is human, in the sense of a knowledge specifically grounded in the coming together of the spontaneity of concepts and the receptivity of the perceptually given; this is the knowledge available to the human being. There is no partaking of any divine knowledge. Knowledge is human cognition.

This knowledge as human cognition is finite, it does not make its objects, it is the knowledge possible for the human; yet it is such a knowledge that as Heidegger puts it “no knowledge can contradict it without losing all content at the same time, i.e., all relation to any object and consequently all truth” (KPM, 11). In other words, even if human knowledge is finite, it is the knowledge available to the human being; it provides the possibility to reach the truth, understood as the verified propositions of mathematical physical science.

In this regard, Heidegger writes that

In full consciousness of the scope of the definitions that he has to offer, Kant places at the beginning of his work the proposition which, according to his interpretation, circumscribes the essence of human knowledge. 'In whatever manner and by whatever means a mode of knowledge may relate to objects, *intuition* is that through which it is in immediate relation to them, and to which all thought as a means is directed. But intuition takes place only insofar as the objects is given to us. This again is only possible, to man at least, insofar as the mind is affected in a certain way'. (A 19, B 33, N.K.S., p.65.) (WT, 134).

Heidegger writes that

This essential definition of knowledge is the first and completely decisive blow against rational metaphysics. With it Kant moved into a new fundamental position of man in the midst of what is, or more precisely he lifted a position, which, at bottom, had always existed, into explicit metaphysical knowledge and laid the basis for it (WT, 135).

Knowledge happens in the circle between intuition and thought, Kant also calls this twofold composition sensibility and understanding, or receptivity and spontaneity (WT, 144). Against rational metaphysics, Kant includes intuition as a fundamental aspect of knowledge, but retains the mathematical character of modern metaphysics, the priority of thought over Being. The title of the work *The Critique of Pure Reason* is still concerned with pure reason, but with its very essential determination, its critical configuration, its *critique*, the delineation of thought over Being has to account for perception.

In this regard, Heidegger writes that now

the priority of the question of judgment [the act of the understanding, of thought] does not have its ground in the fact that the essence of knowledge is really judgment, but in fact that the essence of judgment must be defined anew, because it is now conceived as a representation related in advance to intuition, i.e., the object (WT, 146).

Beings become objects in the statements of science only when their sensible impressions are subsumed under the basic categories of thought of the pure understanding (quantity, quality, relation), which operate in the subject in advance of the specific intuitions; themselves conforming to the pure intuitions, which precede all sensible perceptions, as will be articulated below.

The conception of the perception: a thinking intuition, this is, for Kant, the essential constitution of judging as a function of thought. This fundamental, necessary relation of percept and concept must be constitutive for all the judgments regarding

objects, indeed this is the condition for all objective statements to be made.

Against rational metaphysics, where knowledge in general is circumscribed to the assertions of pure reason in the connection of concepts alone, now asserting must connect also to the percept, to sensible presentations; and even if the basic concepts of the principles predetermine in advance how the percepts are to be grasped, for instance in the concept of quantity, compared to a thought that connect only concepts and considers the senses unreliable, this really means that perception is established to a predominant place, so that thought is put in service to it.

Heidegger stresses that, now, in view of rational metaphysics, of a knowledge fundamentally based on concepts alone, the following was decisive for Kant: "(1) To assert, in general, the intuitive (sensory) character of human knowledge as a fundamental component of its essence; (2) On the basis of this altered definition, to also determine anew the essence of the second component, thought and concept" (WT, 142). And that is why Heidegger contends that "The modest extend of the aesthetic-as the initial separate doctrine of intuition-is only an outward appearance. Since the aesthetic is now decisive, i.e, everywhere plays an authoritative part, therefore it makes so much work for logic...[which] must turn out so extensive" (WT, 147). The novelty of the delineation of knowledge as the primacy of thought that is yet based on intuition, thus in its service, forces the elaboration of thought itself in a new delineation that is so much longer.

4.5 The Retention of the Mathematical Character of Modern Metaphysics in Kant's Critique of Pure Reason

The Being of beings comes to be defined out of the all encompassing, purveying projection of the mathematical, which now must include both thought and perception. The axiomatic propositions opening the field for any true knowledge are mathematical principles in which all beings come to be objectified, that is, taken sensibly and rendered conceptually in human consciousness.

As said before, for Kant most concepts are taken from sensual experience, from empirical knowledge, as the weight of an object, the roughness of its surface, its impenetrability; yet few concepts are not obtained from the objects in perception, but are brought by the mind in advance, a priori. Kant writes that

if from your experiential concept of a body you gradually omit everything that is empirical in a body-the color, the hardness or softness, the weight, even the impenetrability-there remains the *space* that was occupied by the body (which now has entirely vanished), and this space you cannot omit [from the concept]. Similarly, if from your your empirical concept of any object whatever, corporeal or incorporeal, you omit all properties that experience has taught you, you still cannot take away from the concept the property through which you think the object either as a *substance* or as *attaching* to a substance...Hence you must, won over by the necessity with which this concept of substance forces itself upon you, admit that this concept resides a priori in your cognitive power (Kant 1787, 47-48).

The same can be said of cause and effect; sensible intuitions do not provide us directly the concept of causality, that there is a necessary cause for a specific effect. Perception alone does not bring an absolute certainty that one event will necessarily follow another. Perception does not directly provide this necessity sensibly; it is restricted to the now and the memory of the past, while the principle of causality stretches backward in time and forward into the future giving us certainty that certain events are, have, and will always be everywhere causative of specific effects.

For Kant the concept of causality, the necessary succession of a cause and its effect, this necessity of cause and effect, is brought by thought, by the pure

understanding. What does connect causatively needs to be learned empirically, through perceiving; yet it is in view of the principle of causality held in the mind in advance that the necessity of the constancy of cause and effect can be accounted for and held in the law-like propositions and equations of mathematical physical science.

Kant writes that “even though all our cognition starts **with** experience, that does not mean that all of it arises **from** experience” (Kant 1781, 44). The "splendid example" that he gives for this type of knowledge that does not arise from experience and yet it is inclusive of it is mathematics, or better, pure mathematics. Kant writes that “mathematics provides us with a splendid example of how much we can achieve, independently of experience, in a priori cognition” (Kant, 1781, 49). He writes that

We must note, first of all, that mathematical propositions, properly so called, are always a priori judgements rather than empirical ones: for they carry with them necessity, which we could never glean from experience. But if anyone refuses to grant that all such propositions are a priori—all right: then I restrict my assertion to *pure mathematics*, in the very concept of which is implied that it contains not empirical but only pure a priori cognition (Kant, 1787, 56).

For example in “the union of two numbers into one”, in the arithmetic sum of two numbers, the concept of sum is a priori, that is belonging to the sphere of thought alone, holding the necessity that summing will yield one number; but the adding of the two numbers into their “union” number must make use of the fingers or a dot notation and is thus synthetic, in that it is reached through intuition, the perception of the fingers or the dots.

For Kant, pure mathematics is a knowledge of the highest order, it is a priori, that is, it holds a necessity within the concepts which forms it; it is pure, that is, conceived by thought alone, yet it is also synthetic, in that it is carried in perception; indeed it is a type of knowledge that can be applied to experience, yet it is formed in advance of experience.

The priority of pure mathematics and its being synthetic at the same time provides the model and the guide for the delineation of the foundational principles of the pure understanding, the categories of thought, which are, at the same time a priori held in the mind, the concept of sum; and synthetic of that which appears in sensible perceptions, the dots and the fingers.

Rational metaphysics stakes the basis for any knowledge in fundamental principles whose concepts, like that of causality, are brought by the mind, by the pure understanding, in advance. That is, they are devoid of the transience of perceptual experience, they are a priori concepts that account for all the transitory aspects of perceptual experience; and these concepts, as foundational for any knowledge, spring forth from the mind. Kant maintains that even if most concepts are taken from perceptual experience, there are few that are fashioned from thought alone, just like the concepts of pure mathematics. And these are the pure, necessary, and conditional concepts at the base of any knowledge.

Now for Kant the issue is not to only assert these basic concepts in principles as rational metaphysics had done until then, he wants to demonstrate the validity of these principles as foundational for any experience, in demonstrating that these principles operate in-advance of any specific phenomenon, yet, at the same time, that they fundamentally belong to the very appearing of any natural phenomenon, and thus provide the foundation, that is, the condition for the possibility of any knowledge whatsoever, that is, of knowledge understood as mathematical physical science, that is, as physics, as chemistry, as astronomy.

Now then the question is not only to assert the principle of pure reason that are

foundational and make possible to state the law-like propositions of physics, the laws of physics as objective knowledge; the question is to delineate how thought and perception come together in such a way that this union renders possible the knowledge of nature as nature is, that is, nature as understood by modern physics.

At the beginning of modern metaphysics, pure reason, as mathematical reason, what Heidegger calls the mathematical projection of nature, stakes the priority of mathematical, of calculative thought over and above all beings based on itself, on thought alone. Now, though, the staking of this priority must be carried in view of that which is encountered sensibly, that is, it must demonstrate its fundamental prior accountability for the appearance of the objects of experience, i.e., as condition for the possibility of all the facts of science. It must articulate the apprehension of beings as objects at the very base of its own projection, that is, account for their appearance, their manifesting, their being there. This articulation must follow the guidance of the principles, but the principles must not only connect concepts with concepts, but concept with percept, the objective unity standing as the ground for the calculative approach to nature.

Heidegger points out that Kant overcomes the definition of judgement operative in his time, that is, that the judgment in general is conceived to connect concept to concept. The logical form of judgment in general is conceived not only to connect concepts (in subject and predicate), but must be objective, must to be inclusive of the very sensible appearance of the objects, i.e, their perception. The new definition of the judgment is, Heidegger writes, quoting Kant, “that a judgment is nothing but the manner in which given modes of knowledge [cognitions] are brought to the objective unity of apperception” (WT, 157).

Heidegger writes that

The discussion is no longer of representations and concepts, but of 'given cognitions,' of the given in knowledge, consequently, of intuitions. He [Kant] speaks of 'objective unity.' Here judging as an action of understanding is not only related to intuition and object, but its essence is defined from this relation and *as* this relation (WT, 157).

All propositions that aim to assert the truth about objects must conform to the general form of judging, that is, that the concepts unified in the proposition must unify also to that which is sensibly given in perception, the objects. The proposition as function of thought relates not only conceptual representations, but also a unification of concept and percept, a unification that happens in the human cognitive faculties of thought and perception. This is the new definition of the ego cogito, of the I think, of human consciousness as knowing consciousness.

Kant writes that

Understanding-speaking generally-is the power of *cognitions*. Cognitions consist in determinate reference of given presentations to an object. And an *object* is that in whose concept the manifold of a given intuition is *united*. But all unification of presentations requires that there be unity of consciousness in the synthesis of them. Consequently the reference of presentations to an object consists solely in this unity of consciousness, and hence so does their objective validity and consequently their becoming cognitions. On this unity, consequently, rests the very possibility of the understanding (Kant 1787, 181). Here the *res cogitans* of Descartes, the I represent, finds a sharper delineation, in grounding knowledge in general, that is, in the unification in human consciousness of beings' presence in both perception and thought.

Beings find their Being by becoming the objects of human representing, in the coming together in one consciousness of perception and conception. Objects find their standing, that is, their Being in human representing. Their manifestation as real is established in the intelligibility of their being in relation to the subject's consciousness and its cognitive faculties. Heidegger writes that "for Kant, that which is becomes the

object of a representing that runs its course in the self-consciousness of the human ego” (PLT, 174).

For Kant the objectivity of objects comes to be delineated in view of the conditions of the possibility of subjective representing, in the sense that the object is, in its *very* being, an ob-ject on the basis of and for a sub-ject. The proper intelligibility of anything is now referenced to the human representing that takes what encounters in perception and conceptually grasps it, thus fixating, positing its being for itself. So that knowledgeable statements regarding objects, can arise as human experience, in the highest and proper sense: truth as objective knowledge, mathematical knowledge of nature.

The knowledge of beings is brought forth, is pro-duced in human cognition; the realm whence knowledge is to be worked out from is the cognitive power of man, from its receptive and spontaneous aspects. Here is delineated and takes a definite form the modern understanding of knowledge as a human production, in the ordinary sense of “bringing-forth” into existence, into Being, understood as human representing, in the sense of the security and certainty afforded by the clarity of the delineation of the conditions for the justification of mathematical physical science as the knowledge of nature. The Being of beings comes to reside in the coming together of pure understanding and pure intuition as condition for the possibility of true statements regarding the objects of nature.

Kant, as Descartes, articulates the foundation of any knowledge in the unity of consciousness, in the I think, specifically, and anew, in the circle of intuition and understanding, and though the understanding still maintains its mathematical projective

power, it does so in service of intuition. The analysis of experience in general, elaborated by Kant, clarifies, as Heidegger puts it, that “the sensory given and rational thought are two different ingredients of any experience” (WT, 269). In the context of the history of the West, understood as philosophy, Kant explicitly returns perception to a fundamental position, a position that, whether explicitly or not, is foundational for all metaphysics, that is, for an explication of knowledge in general, for experience as such.

The further articulation of the mathematical character of modern science, initiated by Descartes, develops in Kant, in that the ground of representations as foundational to knowledge must, retaining the priority of reason itself, explicitly include sensible perceptions, so that the objects of experience, the coming together of concept and percept, can be formed in the propositions of science. Now Being is approached out of the definition of this relation, of concept and perception, and as this relation.

After the decadence of Scholasticism into mere verbal argument, modern science, through rational metaphysics and its critique, reevaluates explicitly the perceptual as ground of any knowledge, in the specific delineation of the principles of the pure understanding and pure intuition, both grounded, in advance, in the human mind, the I-think.

The articulation of the rapport between pure intuition and pure understanding grounded in the unity of human consciousness provides the ground for the understanding of the object as such, that is, the thingness of the thing, the objectivity of the object, that is, the sense of objectivity foundational for modern scientific inquiry.

The fundamental expectation to find the truth in mathematical equations must be grounded on an overall approach to the Being of beings, an ontology of nature, that opens

the possibility to have scientific, objective knowledge of nature. Here then lies Kant's innermost task of the *Critique*, to lay, in clarity, the conditions for the possibility of the mathematization of nature, the mathematical projection of nature, that is, the understanding of the Being of beings, so that the use of mathematics becomes the proper, necessary way to learn regarding all the beings of nature.

Free from any past, authoritative, and divine revelatory and binding insights regarding the essence of things, and for Kant really lacking this immediate absolute knowing, the human takes stock of its own cognitive capacity to think regarding that which is received through the senses, coming to an initial representing in the categories of the pure understanding and the forms of pure intuition.

With the ascendancy of modern metaphysics, the ground of the Being of beings comes to squarely reside in the eminent subject (Descartes), whence the categories, the ideas, the principles of that which is, become the guiding approach to any knowledge. These reside in the human, in the prerogative of the human to pre-determine regarding the essence of things, on the model of the mind of the personal creator God and his benevolence. This model dissolves with Kant, in that the human being lacks the creative fullness of divine perception, so that the human being as subject needs both thought and sensual perception, the basic components of human cognition in the proper sense.

For Kant when knowledge in general is considered as to its ground, this pertains with basic concepts, that which is purely in the mind of the subject, in the I think; yet this is not enough. The predeterminative power of the categories is accomplished in the purity of reason, in principles, but the predetermination must explicitly include in demonstration its relation to the objects in their very sensual appearing, that is, their appearance in

perception.

In other words, Kant aims to delineate the essence of experience by which the objects of nature appear in the original relation between pure intuition and pure understanding, giving a foundation to modern mathematical physical science. What is, then, the essence of experience understood as mathematical physical science? The coming together of perception and thought in human consciousness.

Kant aims to delineate and demonstrate the principles which allow the things of nature to become available as objects of experience in the propositions of science, that is to say, how nature in general, the thingness of the thing, is to be understood and thus approached in scientific research.

Still, in Heidegger' interpretation, Kant's answer remains well within the prerogative of thought over Being of all modern metaphysics, that is, that the

definition of the thing, namely that a single thing for itself is not possible and, therefore the definition of things cannot be carried out by considering single things. The thing as a natural thing is only definable in a relational context which lies *before* and *above* all nature...the definition of the thing and the way it is set up include fundamental presuppositions which extend over the whole of being and to the meaning of being in general (WT, 129).

Kant aims to define the Being of beings still out of pure reason, which now must include its relation to pure perception, which as said before brings the understanding to a position of service to perception. In this sense, then, Kant aims to overcome rational metaphysics with what he calls transcendental philosophy; yet, for Heidegger, he firmly remains and develops even further the mathematical projection of nature, as the modern answer to the question of Being. In the answer in which Being is equated with human representing, precisely in the twofoldness of human cognition.

As said above, Heidegger contends that, if modern science pertains itself with fact, observation, and calculation, modern science is not essentially based on fact, observation, or calculation, but on a fundamental understanding of the Being of beings, that is, a metaphysical stance, that Heidegger denotes as the mathematical projection of nature. Mathematical here understood in the ontological sense articulated above, as the articulation of the understanding of Being, which equates Being with mathematical representing.

Modern metaphysics mathematizes nature which is then to be studied by modern mathematical science, in physics, chemistry, biology, etc.. Modern metaphysics' understanding of the Being of beings and Being as a whole articulates a fundamental ontological stance which consists of the objectivity of objects-the mathematization of nature, and the subjectivity of the subject-the cognitive faculties of the human being.

4.6 Transcendental Philosophy: the Coming Together of the Transcendental Aesthetic and the Transcendental Logic

For Kant knowledge as such is grounded in the I-principle and the pure reason that belongs to it, the subject proper, the human being. Now pure reason branches into pure understanding and pure intuition, the inner structure of experience, i.e., the mathematical projection of nature that grounds scientific knowledge. The inner constitution of knowledge is delineated by Kant in *The Transcendental Aesthetic*, dealing with Pure Intuition, and the *Transcendental Logic*, where the System of all the Principles of Pure Understanding is delineated, and where such a system is grounded in the

demonstration of the possibility of its principles in view of the pure aesthetic.

Here Kant is delineating the principles of logic that provide the justification for the possibility to make true statements about the objects of nature, before any statement of facts, but precisely how all facts can and are to be stated; that is, in view of the essential mathematical nature of knowledge, a knowledge that opens the way for all facts.

Heidegger writes that

transcendental knowledge does not investigate the being itself, but rather the possibility of the preliminary understanding of Being, i.e., at one and the same time: the constitution of the Being of beings. It concerns the stepping-over (transcendence) of pure reason to the being, so that it can first and foremost be adequate to its possible object (PIKCPR, 10).

The mathematical projection of nature, for instance, in Newton's laws, understands the objects of nature in a certain way, as uniformly moving points of mass, unless a force intervenes; this is not readily apparent in perception, so that a fundamental justification beyond its practical results is sought for this type of knowledge, for the law-like propositions of modern mathematical science that account for nature in advance of all the possible perceptions of natural phenomena. The coming together of the transcendental aesthetic and the transcendental logic aim to provide such a justification.

The transcendental logic unfolds with the transcendental aesthetic so that cognition of objects can arise. In other words, pure understanding arises in the human, a priori, but it necessarily relates to pure intuition by which presentations are obtained of that which is outside the human subject; the transcendental logic is a priori in that it precedes experience, and it is synthetic, in that it connects with the forms of pure intuition which permit all sensual presentations, all perceptions. So that it is transcendental, in that it steps beyond itself in the coming to meet the beings that are outside of itself, as they are given in perception, in sensibility, so that they can become

objects of human knowledge. Thus the principles of transcendental logic are both a priori and synthetic.

For Heidegger, the transcendental philosophy is the historical attempt to articulate the metaphysical stance underlying modern mathematical science. It means that in ontological reflection pure understanding and pure intuition are rendered in their fundamental relevance in “determining the essence of 'transcendental truth, which precedes all empirical truth and makes it possible'” (PIKCPR, 11).

Kant's meditations aim to retrieve the delieantion of the fundamental rapport between subject and object so that knowledge of what lies outside the subject, the objects of nature, can arise at all in the subject. Both the transcendental logic and the transcendental aesthetic originally prepare and bring that which is, the objects of nature that lie outside the subject, to a basic intellegibility in our cognitions, in the subject, in such a way that modern mathematical science is justified as the proper approach to study nature, regardless of its suceses or failures.

Heidegger stresses that this knowledge, these cognitions “precedes all empirical truth and make it possible”. Ontological knowledge, the transcendental, precedes the knowledge of specific objects, i.e., general ontology, *metaphysica generalis*, the knowledge of nature in general precedes and makes possible *metaphysica specialis*, the specific knowledge of this or that object of nature.

Heidegger writes that

ontic truth necessarily adjusts itself to the ontological...Nothing can be presupposed on behalf of the problematic of the possibility for original, ontological truth, least of all the *factum* of the truth of the positive sciences. On the contrary, the ground-laying must pursue the a priori synthesis exclusively in itself, pursue it to the seed [*Keim*] which provides its ground and which allows that synthesis to develop into what it is (allows it to be possible in essence) (PIKCPR, 12).

In the transcendental logic, specifically in the Analytic of Principles is carried the demonstration that and how the axiomatic propositions, the principles of the pure understanding, relate to the Transcendental Aesthetic, and thus are prerequisite of experience as objective, that is, how the principles are a priori synthetic judgments delineating the objectivity of all objects, that is, the Being of beings. Heidegger interprets that what is at stake in this demonstration are the fundamental principles of all knowledge, metaphysics, “that which is knowable and known by the pure reason of man. That is, what is”, the fundamental principles “are the fundamental determination of its essence, being” (WT, 116).

Pure reason remains as the ground of all knowledge, in the specific delieantion in which the transcendental logic is now assigned a fundamental role that is at the service of intuition, of the trascendental aesthetic; yet it retains, at the same time, the projective prerogative belonging to the subjectivity of the subject.

This reflection on the inner constitution of experience, as scientific knowledge, in the demonstration that the principles of the understanding bring all perceptions of the objects to their proper intelligibility, once accomplished in the *Critique*, is propedeutic to all further knowledgeable encountering of beings as objects, to all experiencing in view of the truth, that is, scientific knowledge regarding nature.

The mathematical projection of nature is established upon its proper ground in The Transcendental Aesthetic, dealing with pure intuition, and in Transcendental Logic in the Presentation of All the Synthetic Principles of Pure Understanding, where such a system is grounded in the demonstration of the possibility that the highest categories of thought are pure of chance experience and yet they reach out and engulf all beings of

nature in their very sensible appearing. They synthesize this perceiving into a cognition, that is, a knowledge that is always and everywhere valid, thus a knowledge that is valid for all subjects, it is inter-subjective, and for all objects, it is objective. The principles are the axiomatic prerequisite, the conditions for experience as objective knowledge, as scientific knowledge.

In Heidegger's interpretation, Kant thinks about the ground for knowledge as such. This is found in the self reflection of the transcendental philosophy, which aims to articulate the fundamental happening of knowledge, "the initial representing" (KPM, 26) for all further representing.

The self reflecting of reason in transcendental philosophy illuminates the ground, that is, the conditions for the possibility of knowledge in general, which are laid in advance of any experience, in that this is the proper essence of the mathematical character of modern science. In this regard, Heidegger writes that "Knowledge of beings is only possible on the grounds of a prior knowledge, free of experience, of the constitution of the Being of beings...If finite knowledge of beings is to be possible, then it must be grounded in a knowing of the Being of beings prior to all receiving" (KPM, 26).

The mathematical character of modern science grounded in the *Critique*, the finite way in which knowledge is possible, must sketch in advance the Being of beings, that is, the overall understanding of nature which is already operative for the mathematical physical science to proceed as it has since the time of Galileo, of Descartes, of Newton.

Kant attempts to articulate this sketched project, the "initial representing", which makes possible the modern understanding of Being as mathematical representing, as mathematical physical science. Now this ground must, not only be *a priori*, in the pure

concepts of the understanding, but also, at the same time, be synthetic, that is, uniting the concepts with the given objects of perception, and thus with pure perception.

Yet since modern science, the existing scientific knowledge of the objects of nature is already happening, then the "initial representing", the ontological ground that makes such knowledge possible, is also itself always already synthetic, since it fundamentally allows the intelligible availability of the objects laying outside the subject. Heidegger writes that "The ontological synthesis, as knowledge in general, is already synthetic, so that the laying of the ground must begin with a getting forth of the pure elements of pure knowledge (pure intuition and pure thinking)" (KPM, 27).

4.7 The Conditions for the Possibility of Experience as Scientific Knowledge: The Demonstration of the Principles of Experience as A Priori and Synthetic Propositions

It is in the "System of All Principle of Pure Understanding", Heidegger writes, that Kant aims to delineate "the essence and essential structure of experience" (WT, 126), and this is found to pertain with the conditions for the possibility of experience. In Kant, the articulation of the essence of experience looks for its possibility of being, before and above all experience. Heidegger writes that "The essence of a fact (*Sache*), according to modern metaphysics, is what makes the fact as such in itself possible: the possibility, *possibilitas*, understood as that which renders possible. The question of the essence of experience is the question of its inner possibility" (WT, 126).

Heidegger then asks "What belongs to the essence of experience?" (WT, 126) This

question at the same time includes the question: "What is the essence of what becomes truly accessible in experience?" (WT, 126) Heidegger answers that for Kant experience has a twofold meaning "(1) Experience as happening to and an act of the subject I. (2) That which is experienced in such experience. Experience in the sense of the experienced and the experienceable, the object of experience, is nature. But nature understood in the sense of Newton's *Principia* as *systema mundi*" (WT, 126).

Thus in Kant's articulation of the essence of experience, as the possibility of mathematical physical science, the modern mathematical projection of nature finds its clear explication—a more sharpened understanding of itself in the clarification of the subjectivity of the subject and the objectivity of the object.

Heidegger writes that "The grounding of the inner possibility of experience is, therefore, for Kant at the same time the answer to the question: How is nature in general possible? The answer is given in the 'System of All Principles of the Pure Understanding'" (WT, 126). Here Kant aims to articulate the understanding of the Being of beings that supports modern mathematical science. Heidegger writes that "The setting up of the system of principles is the taking possession of the solid land of the possible truth of knowledge. It is the decisive step of the whole task of the critique of pure reason" (WT, 127).

In a letter, Kant writes that "The analysis of experience in general and the principles of possibility of the latter 'are' the most difficult of the entire critique (*Brief*, Cassiner X, 114; Akademie edition, XI, 313ff.)" (WT, 127). In the same letter, Kant writes that "this whole analysis has only the intention of setting forth the fact that experience itself is possible only by means of certain synthetic *a priori* principles" (WT,

127).

Kant's answer to the question regarding the possibility of experience as such, the is, as scientific knowledge, pertains with the question regarding the Being of beings. This questioning must, for Kant, reflect upon the innermost possibility of experience, when this possibility is demonstrated, it, then, supports its actuality, its existence; that is, grounding the knowledge of nature in modern mathematical physical science, knowledge in the true sense, in Kant's terms, experience.

This demonstration is achieved in that the conditions for the possibility for the mathematical projection of nature, the Principle of Pure Understanding are demonstrated to be, as conditions for any knowledge, synthetic and a priori principles. This is to say that, the principles are held in the mind, a priori, and, at the same time, synthetically bring perceptions to an intelligible stand, so that the objects of nature can be studied through mathematical physical science.

To clarify, at the time of Kant, in the general delineation of reason, that is, of logic, of judging in general, judgments are understood to be of two kinds: analytic and synthetic. An analytic proposition is a proposition in which the predicate intrinsically belongs to the subject, that is, it is conceptually explicit in itself, example: bachelors are not married, "All bodies take up space", houses have a roof. The predicate of such propositions does not leave the subject but analyzes, that is, it draws out, it clarifies the essential meaning of the subject.

On the other hand, synthetic propositions are propositions in which the subject-predicate relationship is reached by taking its way via the object itself, it accomplishes a reaching out to the object, example: "some bachelors are happy", bodies have weight.

Only by sensibly encountering the bachelors and bodies, it is possible to ascertain what is predicated about them, that they are happy or heavy, and this extends the knowledge of them. Heidegger writes that “A judgment is either analytic or synthetic, i.e., the basic ground of its truth is either in the given subjective concept or in the object itself” (WT, 170).

Heidegger writes that

In the clarification of the nature of the mathematical and in the description of the development of mathematical thought in modern natural science and modern modes of thought in general, we ran into a striking fact. For example, Newton’s first principle of motion and Galileo’s law of falling bodies both have the peculiarity that they leap ahead of what verification and experience, in the literal sense, offer. In such principles, something has been anticipated in respect to things. Such anticipations rank ahead of and precede all further determinations of things (WT, 165).

Yet, as said before, Heidegger emphasizes that this does not mean that “these anticipations as such become familiar to us first. Rather, the anticipating principles are first in rank when it is a question of grounding and constructing our knowledge in itself” (WT, 165).

For example, what is posited in advance regarding a moving object is that it is a point of mass subject to forces, this is the definition, the standard for all moving objects. The laws of motion are statements conceived as valid for all moving objects right in view of their definition as points of mass subject to forces. The laws have comprehensive, predicative power for any objects’ motion, ahead of any experimenting, in that they are objective because they fit with the basic definition of objects. The laws of motion predict the behavior of the locomotion of any objects, from out of an in advance, a priori determination of any object, as a point of mass impressed by force, that is, out of an essential determination of the objects that cannot be demonstrated in a straightforward

perceiving, but it assumes, not arbitrarily (being a possible way to understand objects), that that is how objects *are*.

What has been anticipated with respect to all objects permits the lawfulness of motion to be stated in the judgements ruling this fundamental and ubiquitous phenomenon, the motion of all objects, of all things (WT, 165). How objects and their motions is firstly experienced and made manifest provides the ontological conception for the establishing of the law, which itself will guide any further experimenting regarding moving bodies.

In Latin such anticipating, this in advance projecting regarding beings, is called *a priori*. Heidegger writes that “What enables the thing to be what it is *pre-cedes* the thing as regards the facts and nature, although we only grasp that which precedes after taking account of some of the most obvious qualities of the thing” (WT, 165-166). In this sense, he writes that “The priority of the *a priori* concerns the essence of things” (WT, 165).

In other words, this concerns the understanding of the Being of beings that guides all activities in which the truth is sought, that is, the basic definition of what beings are as beings. And this understanding of the Being of beings, if it must start by looking and surveying beings, it looks at beings in the overall approach that asks not regarding their use or other specific connotations, but regarding their "natures", what they *are* as beings, regarding their being, i.e., an interpretation of the meaning of Being in general. In modern metaphysics, this questioning regards nature in view of the motions of natural bodies, right in view of the representing subject.

Heidegger writes that

According to how the thingness of the thing is grasped and the being of what is is understood, so also is the *a priori* and its *prioritas* interpreted. We know that for modern philosophy the I-principle is the first principle in the order of precedence of truth and principles, i.e., that which is thought of the I as the prime subject. Thus it happens that, conversely, everything thought in the pure thought of the subject holds good *a priori*. That is *a priori* which lies ready in the subject, in the mind. The *a priori* is what belongs to the subjectivity of the subject. Everything else, on the contrary, which first becomes accessible only by going out of the subject and entering into the object, into perceptions, is-as seen from the subject-later, i.e., *a posteriori* (WT, 166).

So that, analytic propositions find their ground solely in the mind of the subject, and are *a priori*, while judgements pertains with the objects received in perception are *a posteriori*, they are synthetic.

Since analytic judgments determine the subject-predicate relationship out of the sphere of conceptual analysis, i.e., from mere thought, then all analytic judgments are *a priori*. Correspondingly synthetic judgments are *a posteriori*, in that they involve a reaching out to things, in that they consider that which is perceived of things, thus encountering the things, the external object, and from the perceived things the predicate is established. Rational metaphysics stakes the ground of knowledge out of concepts, *a priori*, but claims to know the object themselves, that is, synthetically.

Kant aims to overcome this inconsistency by proving that the principles, the judgements which lie at the base of human knowledge, to be both *a priori* and synthetic judgments, that is, judgments that are originated and held *a priori* in the subject, and that they synthetically include the knowledge of the objects of nature, that is, how nature manifests sensibly to us, how it is essentially available to us, that is, how nature *is* for a possible human knowledge.

The justification that human knowledge out of concepts is possible lies in that these concepts held *a priori* must fundamentally reference and include the objects as they

appear, in the true synthetic indication of how beings meet the subjects as the objects that they are, sensibly. Heidegger writes that the “principles that underlie our human knowledge as conditions of its possibility must have the character of synthetic judgments *a priori*” (WT, 169).

In making the distinction between analytic and synthetic, *a priori* and *a posteriori* judgments, this is what Kant aims to demonstrate: that the principles which are *a priori*, held in the mind of the human, that they are also synthetic, in that they belong to the objects of perception, that is, in how beings appear, how they manifest to us. By demonstrating that the principles of knowledge are *a priori* synthetic judgments, this demonstration then justifies the modern scientific approach to nature, the mathematical projection of nature, as human knowledge proper, which Kant calls experience in the proper sense.

Kant aims to articulate the initial representing of the essence of things for modern science to be, which is already happening in any scientific proceedings. Knowledge as such happens in the relation of the basic categories of thought, with the given of perception, coming to be in the unity of the I think, in the happening of representations, of the I represent. Kant aims to articulate and prove the initial representing that sustains in justification the validity of all mathematical representations.

The principles laying at the base of human knowledge, as the very possibility of any knowledge, are synthetic principles of the pure understanding: they are both *a priori* and synthetic judgments. The demonstration of such possibility is the condition for the objects of experience to be, as true experience of nature available to human beings.

Since for Kant the basic composition of knowledge is of perception and thought,

now the basic principles of knowledge have to unite perception and thought, that is, the principle have to be shown to contain both the priority of the concepts and be synthetic of the sensible appearance of things, as a true beginning for any knowledge whatsoever, and that is, for any scientific knowledge. The principles are the initial representing happening in the subject of what lies outside the subject, the objects of nature. The principles articulate the composition of experience as such, that is, perception and thought, and, at the same time, what nature is.

Here resolves Kant's inquiry to delineate, to decompose, out of its intrinsic unity as a system, the basic composition of the intelligible presence of objects to a subject, to the human being. Objects appear to the subject in sensibility, that is, in pure perception, and in the principles of the pure understanding. The presentations of perception are gathered, that is, made initially intelligible by the principles, that is, by the categories of pure thought, so that these principles govern the way we knowledgeably can speak of the objects of nature.

Upon the demonstration that the principles are synthetic and a priori judgements lies the condition for the possibility of the truth in the works of modern science. The condition for the possibility of knowledge relies upon the objects being perceived, and at the same time come to an intellegible stand in the pure concepts of the understanding.

The objects of experience happen, as objects of experience, in the togetherness of their sensible apprehension and conceptual comprehension of and by the subject. Thus in the analysis of these two fundamental moments, these two “stems” of any knowledge, Kant aims to articulate the nature of experience, that is, the condition for the possibility of the knowledge of nature as such.

If objects are at all for us, they must appear to us, being there in presence for us, they must be perceived and they must be conceptually grasped. Heidegger writes that for Kant “The object stands only when the intuition is thought conceptually, and the object confronts us if the concept designates something intuitively given” (WT, 141). Kant reflects upon the togetherness of this intelligible appearing, but retroactively, because it is always already happening.

Kant, aiming to retrieve the conditions, that which is formative of experience, of any scientific knowledge finds pure intuition and pure understanding. The purity is the priority of the conditions for every true, objective knowledge. It is the foundational approach to any knowledge. This predetermined pre-senting of the objects must delineate the components that are always already operative in every appearance, and every statement of science: pure intuition and pure understanding.

In such a delineation of knowledge in general, the question regarding the nature of the object itself is now approached and subsequently posited. The object for knowledge exists when it stands versus a subject, that is, when it is represented, and this happens in the cognitive faculties of perception and understanding.

4.8 The Transcendental Aesthetic, the Forms of Pure Intuition: Space and Time

Now that reason, the logic at the base of all human knowledge must be delineated in reference to intuition, intuition must be sketched in its purity as an a priori faculty of cognition, that is, in the purity of its priority as condition for all sensible receiving. This

is delineated in the *Transcendental Aesthetic*. Here *aesthetic* is not meant in the modern sense of ascertaining a standard of beauty or some value of how things look, but it references to the ground for the sensible apprehending of things, their sensible receiving.

The *Transcendental* means that the subject encounters from out of itself that which itself is not, that which lays outside of itself. The transcendental is that which is sensibly accessible of the things, and thus is available to be known at all; the receiving of that which is given of the objects in intuition in its purity. All sensible intuitions, all perceptions happen in the pure intuition which in advance opens up the realm for all the sensations, the presentations of the senses: the sensory data of today.

The multifold of what shows itself in intuition does so in the pure intuition which is condition for the appearing of the appearances. The *Aesthetic* stem of knowledge opens the possibility for the knowing of all appearances. The *Transcendental Aesthetic* pertains to that which is fundamental to any knowing: pure intuitions, the forms of all perceptions, i.e., that which is formative for any sensible impression.

In order for the objects to be at all, they must appear, they must be perceived by us through the senses, what makes possible such appearing? Kant answers that it is the pure intuitions of space and time. Any appearing object is uniquely located in space and time, which are themselves not really perceived, but provide for all perceptions. Space and time provide the formal, in advance, i.e., *a priori* ground for all intuitions. For Kant space and time are the “pure forms of sensible intuition” within which we perceive what we do. Kant writes that “my intuition contains nothing but the form of sensibility antedating in my mind [subjekt] all the actual impressions through which I am affected by objects” (Kant 1783, 30).

The forms of sensibility, the purely given intuitions preceding the receiving of all possible intuitions are time and space. Kant writes that

Solely with the way of perceiving are we dealing here. Space and time are its pure forms; sensation as such its matter. Only that way of perceiving can we cognize a priori, i.e., prior to all actual perception, and that is why it is called pure intuition. Sensation, on the other hand, is that component of our cognition on whose account it is called *a posteriori* cognition, i.e., empirical cognition (Kant 1787, 95).

In this reflection upon experience, that is, regarding that which provides for experience, Kant's reflection focuses on the appearing of the things, their manifestation in mere being there, in presence. Heidegger writes that "The object is the thing insofar as it appears. Appearance never means semblance (*Schein*) here, but the object itself in its being present and standing there (*Dastehen*)" (WT, 194). In the receptive sensibility, sensations provide the content, the matter, of intuitions, yet for sensations to be there for us at all, space and time, the forms, must be there co-presently and in advance, before any sensation can be perceived by the I-consciousness.

Kant's definition of the composition of appearance is "That in the appearance which corresponds to sensation I term its *matter*; but that which so determines the manifold of appearance that it allows of being ordered in certain relations, I term the *form* of appearance" (WT, 194), i.e., time and space. Moreover, the forms of intuition generally, must precede the content (matter) of intuition which are received *a posteriori*. Kant writes that "Now, that in which alone sensations can be ordered and put into a certain form cannot itself be sensation again. Therefore, although the matter of all appearances is given to us only a posteriori, the form of all appearance must altogether lie ready for the sensations a priori in the mind" (Kant 1787, 73).

As in classical Greek philosophy, appearance is the coming together of form and matter, but here form and matter both resides in the subject, in the mind, in the unifying consciousness of the I-principle. Matter is the content of appearances, the sensations of

colors, sounds, tactile pressures, etc.; the form is the wherein, the order, the structuring of such sensations occurs, the forms of any appearing: space and time. This means that, Heidegger writes, “Space is not apprehended through sensation, it is something intuited in advance-*a priori*-i.e., *purely*...it is what determines in advance everything empirically given...the ‘wherein’ in which the ‘manifold can be ordered’” (WT, 198).

Again, Heidegger writes on this point that “Space is something intuited, and it is something intuited and standing in view in advance-*a priori*-i.e., *purely*. Space is pure intuition. As this purely intuited it is what determines in advance everything empirically given, sensibly intuited” (WT, 198). The same can be said about time. Space, and time, are the forms which in advance condition and allow the appearance of anything appearing, the matter of sensible impressions. They are the forms that predetermine any appearing whatsoever (WT, 194).

Also differently from Descartes, who collapses time into space, as *spatium*, Kant instead articulates what he considers to be the more encompassing nature of time in respect to space. He writes that

Time is the formal a priori condition of all appearances generally. Space is the pure form of all outer appearances; as such it is limited, as a priori condition, to just outer appearances. But all presentations, whether or not they have outer things as their object, do yet in themselves, as determinations of the mind, belong to our inner state; and this inner state is subject to the formal condition of inner intuition, and hence to the condition of time. Therefore time is an a priori condition of all appearance generally (Kant 1781, 88).

If space and time are both pure intuitions, the forms which allow all sensible presentations, time does not only pertain to the determinations of objects located outside the human, in space, but it also pertains with the ordering of the presentations in the inner states of being of the human: all presentations either in the realm of the external world

and/or of the inner state of human being find their formal possibility in time.

Now how space and time, as pure intuitions, are understood to be, will determine how the principles of pure understanding, the a priori and synthetic principles of the pure understanding will be articulated in demonstration, that is, how the most general, a priori, categories are to be formative, in advance of any asserting, of that which appears, and yet be synthetic, that is, inclusive of the objects as such, as they indeed appear in perception, a posteriori. Kant wants to demonstrate that such principles participate with the pure intuitions of time and space in the intellegible appearing of objects as objects in advance of any appearing, and yet from the appearing of the objects.

4.9 The Mathematization of Time and Space

Heidegger relates that in order to understand the whole of Kant's project of grounding knowledge in general, as mathematical physical science, in the principles of all experience as such, that is, in the axioms of any knowledge as synthetic *a priori* judgments, the meaning of magnitude has to be clarified.

Magnitude has a dual meaning, it means *quantum*, that which is sizable, and *quantitas*, quantity, which "is the measure and the measurement of the sizable" (WT, 195). Quantity Heidegger writes "is a determinate unity in which the parts precede and compose the whole" (WT, 195); while quantity, as *quantum*, as that which is sizable, is the whole before the parts. Consequently, "*Quantitas* is always *quantum discretum*" (WT, 195), quantity is always a discrete amount of the *quantum*, of the sizable; while the

quantum as such is a *quanta continua*, a continuous whole. *Quantum* as *continua*, a continuous whole, is “endless”, that is to say, it “presupposes nothing end-like as its condition”, but “it is itself the condition of every division and finite partitioning” (WT, 197). Heidegger writes that “Space and time are equally *quanta continua*, basically sizable, in-finite magnitudes and consequently, possible extensive magnitudes (quantities)” (WT, 197).

At the base of Kant’s project stands the pure intuitions of space and time and their being quantifiable. The pure intuitions, the a priori conditions for any sensation, are both continuous wholes, and as such sizable, i.e., open to be delimited in discrete quantities; and the necessary relation between *quantum* and *quantitas* Heidegger writes is that “*quantitas* always presupposes *quantum*, that magnitude as measurement, as so much, must always be a measurement of something sizable” (WT, 196).

The pure intuitions of space and time are the forms, pre-given in the mind, for any sensations received from the objects, they are preconditions of any sensation. It belongs to the pure intuitions of space and time to be *quantum*, sizable wholes, while the concept of quantity is a “pure concept of the understanding”, so that all perceptions in the *quanta continua* of space and time can be received and rendered by and for the subject through this most basic of a category, quantity; in the discrete, measurable magnitudes in which the sizeableness of space and time is delimited by the presentations of the appearing objects.

The mathematical projection of nature has to mathematize time and space, in a apodictic designation of their being as quantifiable, infinitely sizable wholes for the appearances of any objects; in other words, all sensations of beings as objects are

received and rendered in the quantification of their calculable extensive positioning within time and space. How the object is given in perception and rendered in the principles of the pure understanding, Heidegger writes, comes to be “reckoned in that manner of representation which deals with time and space as *quanta* of calculation” (PLT, 126).

If beings are at all, they have to appear, appearing happens in the circle of pure intuitions and pure understanding, all experience happens in the fulfilling of this coming together, the sketching of what is. This operates a priori, that is, before any experience and as condition of all experience, yet at the same time synthetically, providing for the very appearing of the objects, that is, as condition for all empirical judgments, a posteriori judgments regarding the objects of nature.

In other words, Kant aims to elucidate the understanding of the Being of beings at the core of modern mathematical science. That is, the doctrine that makes mathematical physical science, that is, modern science, not an illusionary knowledge. This is the sketch of the most general determinations of all things, *metaphisica generalis*, which provides the guidelines for the knowledge of all nature which will guide the knowledge of all other specific kinds of knowledge, that is, of, *metaphisica specialis*.

Experience, as knowledge, happens in the coming together of the perceptual and the conceptual, which as originary beginnings are pure, i.e., *a priori*, laying at the ground as the initial representing of objects as such. After the delineation of the forms of the Transcendental *Aesthetic*, i.e., of pure perception, the core of the Transcendental Logic articulates the “Systematic Presentation of all Synthetic Principles of Pure Understanding”, that is, the basic, a priori and synthetic principles which indicate and

clarify how beings become originally available to human knowledge, in the most general sense. This happens through the categories of quantity, quality, relation and modality.

4.10 The Synthetic Principles of the Pure Understanding

For Kant it is the coming together of perception and thought that opens the possibility for encountering objects as they *are*, so that a further knowledge of them becomes possible; and for Kant this means the justification of the mathematical projection of nature, that had developed in the specific works of Galileo, Descartes, Newton, Lavoisier, etc., establishing itself as the approach to Being, to nature that will eventually yield the comprehensive knowledge of the universe, of all the objects composing it, objectively. That is, within the mathematical projection of nature, by which the objects of nature are fundamentally defined and experienced as objective.

What is at stake now is the articulation of the Being of beings, the objectivity of objects, the thingness of the things, what today we call the nature of things in the most general sense, the assumptions regarding the nature of things, the most general assumptions about reality. And these assumptions, these presuppositions happen in the subject. In the "Analytic of the Synthetic Principles of Pure Understanding", Kant aims to demonstrate the synthetic priority of four principles, which then articulate the factual, always already happening, rapport between the subject and the objects, in its most basic configuration. These are, Heidegger writes "the conditions for the possibility of the objectivity of objects" (WT, 193). This is for Heidegger the attempt to articulate, in proof, the mathematical projection of nature as the metaphysical stance of modern

science.

The four principles are divided in two groups. The two principles of the first group, Kant calls the “mathematical” principles. These again do not pertain with mathematics, but as Heidegger puts it, “they concern with the mathematical character of natural bodies”, they are “the metaphysical principles which lay the ground of this character” (WT, 191). The mathematical principles are the Axioms of Intuition, and the Anticipations of Perception (WT, 192).

What the mathematical principles aim to achieve is to account, in reflection, for the circumscription of that which is true and real, of that which is, Being, the perimeter of “the island of truth” upon whose ground a truth can be obtained at all, in that the objects of a possible knowledge become accessible to the human subject in the very way they appear as objects. It is the matter of sketching the pure mathematical principles which allow anything to appearance, thus in Being. The first two principles deal “with the essence of the object”.

What is at stake here is the explication of the very appearing of beings as objects for us, their very being there, that is, the essence of their being, that is, the metaphysical delineation of their objectivity inherent in the subject's mathematical project. These are the conditions for the possibility to talk about objects knowingly, that is, truthfully.

This happens in the general delineation of knowledge in which thought is in service to perception, to pure intuition, that is, the forms of time and space; and yet it is prior to all sensible perceptions. In other words, this is the initial demonstrated relation of pure intuition and the principles of pure understanding that prior to all experience, makes experience, as knowledge, possible at all.

This pertains with the opening of a clearing in the understanding of Being through and for which beings are there for us, in the articulation of the obviousness of the manifestation of that which encounters us sensibly and is known, the being-there of natural objects.

The mathematical principles are the articulation of the objectivity of the objects, that is, how the objects of nature come to appear against the subjectivity of the subject; and that is, within the forms of pure intuition and the synthetic principles of pure understanding, both grounded in the subject, in the unity of its consciousness, the initial representing of that which lies outside the subject, the objects of nature.

Together with the first two mathematical principles, Kant posits two other principles, which he calls dynamical. These do not relate to the objects' appearing, but to their standing, as the fundamental relations in which the objects stand in relation to us and to one another. The Dynamical principles are The Analogies of Experience and The Postulates of Empirical Thought As Such.

In that the objects come to an appearance, they offer resistance, a force of that which stands in space. Heidegger writes that “that which is space-filling, which is spatially present we know from forces which are effective in space...Force is the character by which the thing is present in space” (WT, 191). So that, for Kant, the actuality, the presence of things “is determined from the force (*dynamis*), i.e., dynamically” (WT, 191).

These dynamical principles are the conditions that let the objects stand, be present as they appear in the constancy of their being there for a subject; that is to say, these principles deal with, their state of being of objects as existing. Heidegger writes that the

dynamical Principles “concern...the possibility of an object's standing, of its constancy, or, as Kant puts it, the existence (“*Dasein*), 'the actuality,' of the object, or in our words, the being-present-at-hand (*Vorhandensein*)” (WT, 225).

In other words, Kant, to mean object, uses the German word *gegenstand*, which means that which *gegen*-against stands versus a subject. More precisely, then, the first two principles deal with the against-ness of the object, the third with the object's standing, for and through a subject. The first two principles deal with the sensible appearing of the objects which happens in the coming together of the pure intuitions of space and time and the synthetic concepts of the pure understanding of the first two principles. The third set of principles deals with the coming to a stand of objects, that is, their being there for a subject, in the stability of their appearing. This constancy of their appearance, after they have appeared sensibly, this constancy happens in time, in time relations.

The fourth principle deals with the coherence of beings' state of existence with respect to the 'Postulates', the most general *a priori* judgments, the modalities in which the existence of objects in general can be spoken of. In other words, in judgments that speak of the possibility, the actuality, and the necessity of the objects' existence; and this happens in view of the first three principles of experience, as will become clearer below.

All of these four principles comprehensively and together with pure intuitions ground the subjectivity of the subject and the objectivity of the object, that is, knowledge proper as scientific knowledge, the mathematical projection of nature wherein “The metaphysics of corporeal nature is called *physics*” (Kant 1787, 766). These are the in advance conditions under which nature can be given to us at all, that is, nature

fundamentally understood and experienced as physics.

4.11 The Mathematical Principles

The Ontological Demonstration of the Mathematical Projection of Nature, thus of the Necessity of Using Mathematics in the Study of Nature, as Objective.

The first of the mathematical principles, the Axioms of Intuition states that “All appearances are, in their intuition, extensive magnitudes” (Kant 1781, 233). All the appearances show themselves in space, everything that appears, that is intuitively given, seizes a part of space. Everything is a determined spatiality of space, the lifting out of particular extensional parts, like the spatiality of the moon as it appears in the sky in its curved shape, its perimeter, its distance from earth's horizon, and to other planets, etc..

The manifold of the given perceptions taken within and through the pure intuition of space, the continuous whole of space, are unified as a specific perception in the concept of quantity, extended magnitude, a concept of the pure understanding, belonging to the subject, to the I think. In this regard Heidegger writes “This concept, quantity, brings what is homogeneous and manifold to a stand in a unified collectedness (Gesammeltheit)” (WT, 203).

That is, the homogeneity of the spatiality of the manifold appearances comes to be collected as it appears as an against, for the human consciousness, in the unifying concept of the quantity of extension, which is present a priori in the human mind. The manifold of that which appears in space does appear in the I consciousness in the unifying concept of

extended quantity. Quantity, then, predetermines the way objects appear as objects, in the occupied space of their presence, delimiting the sizable space, the *quantum*, in the *quantitas*, the discrete quantity, that is, their own determinable, quantifiable, spacial extension and the determinations of its spacial relation to other objects.

Thus objects as extended bodies appear in the sizableness of space, in the pure intuition of space. The concept of extensive magnitude, out of pure intuition and pure understanding, brings the intuited objects to a known representing. All appearances, in their first appearing as an against, are extensive magnitudes.

In Heidegger's hermeneutic, Kant participates in the process of clarification of the mathematical character of modern science, the axiomatic character of the mathematical as the predominant approach to the understanding of Being, which marks and is modernity. Yet here the focus is not on the assertion alone of the highest categories, but in the demonstration that these principles are *a priori* synthetic judgments. In Kant, the axiomatic character of the mathematical is grounded, that is, justified in demonstration, it is proven, out of this demonstration it accrues the evidence, it then withstands to be posited as principle.

Heidegger writes that the question about the Being of beings

the thingness of the thing, the objectivity of the object, is answered by the principle and its proof as follows: because objectivity as such is the unity of the collection of something manifold into a representation of unity, and is a conception in advance, and because what is manifold encounters in space and time, what encounters must itself stand against us in the unity of quantity as extensive magnitude. Appearances must be extensive magnitudes. Thereby is asserted about the being of objects themselves something which does not already lie in the conception of something in general about which we assert in a judgment. With the determination of being as extensive magnitude something is synthetically attributed to the object; but it is attributed *a priori*, not on the ground of perceptions of single objects, but in advance, out of the essence of experience as such (WT, 205).

The objectivity of objects is articulated and proven in the demonstration that the first principle is synthetic and a priori. In that all objects appear in the sizeableness of space, the a priori category of extension, as a discrete extension, in advance of any appearing, and, at the same time, intrinsically belonging to the object as it is given in its sensible appearing in the sizeable space, allows the object to be known as object. That is, all objects as appearing are extended quantities.

Heidegger writes

Therefore, appearances are from the beginning extensive magnitudes with respect to their encountering standing-against (*Gegenstehen*). The *quantum*, space, is always determined as these appearing spatial formations only in the synthesis of quantity. The same unity of quantity permits what encounters to stand-over-against (*entgegenstehen*) collectively. With this the principle has been proven. However, thereby, it is also established why all principles which say something about the pure manifold of extension (e.g., the shortest distance between two points is a straight line) as mathematical principles are valid for the appearances themselves, why mathematics is applicable to the objects of experience. This is not self-evident and is possible only under certain conditions. These are presented in the proof of the principle...The application of the axioms of the mathematics of extension and number, and, therewith of mathematics as such, is necessarily justified, because the conditions of mathematics itself, those of *quantitas* and *quantum*, are at the same time the conditions of appearance of that to which mathematics is applied (WT, 204).

Kant, who also calls the mathematical principles, the physical principles, writes in the Prolegomena that "the first of the physical principles subsumes all phenomena, as intuitions in space and time, under the concept of quantity, and is thus a principle of the application of mathematics to experience" (Kant 1783, 54).

The second of the mathematical principles is the Anticipations of Perception; Heidegger writes that the principle states that "In all appearances sensation, and the *real* which corresponds to it in the object (*realitas phenomenon*), has an *intensive magnitude*, that is, a degree (B 207, N.K.S., p.201)" (WT, 206). Heidegger writes regarding this principle that "the real in appearances, the *realitas phenomenon* (A 168, B 209) is that

which, as the first what-content (*Wasgehalt*), must occupy the void of space and time, in order for anything to appear at all, so that appearance and the press of an against(*eines Gegen*) become possible” (WT, 214). Heidegger writes that for Kant “the real is that which must be given at all, so that something can be decided with respect to its actuality or inactuality. The real is the pure and first necessary *what* as such...In this *what*, the real, the object qualifies itself as encountering thus and so. The real is the first *quale* [what] of the object” (WT, 214).

In the appearing moon, the extensive magnitude of its surface, its circumference, distance from earth’s horizon, etc., pertain to the first principle. The second principle, the Anticipations of Perception, pertains to the “what”, the content, of the appearing of anything. This what-content is the shining of the moon’s surface, its luminosity, its color; and this is essentially an intensive magnitude. Heidegger writes that “the *intensio* [intensity], is nothing else than the *quantitas* of a *qualitas*, [the quantity of a quality] or a real, e.g., the moon shining surface...the ‘how great’ of the shining, of the coloring” (WT, 215).

Heidegger precises that “the principle wants to assert that the real has first and properly as *quale* a quantity of degree-and therefore also does sensation, whose objective intensity rests upon the prior givenness...of what can be sensed” (WT, 219). What an object is, is established first in sensations, beings become appearing as sensations, but in the priority of the category of degree, i.e., in the intensity of sensation, the first what of any object.

The anticipation consists in the fact that to perceive a what, there must already lie an anticipation of a what in the pure understanding, i.e., the first quality of the

object as such, the degree of intensity, a quantity of intensity, which in advance, and yet synthetically, allows what encounters in space to appear at all as the intensity of luminosity, of sounds, of colors, of pressures, and so forth.

In other words, Heidegger writes, in this second principle

It is to be demonstrated that the pure concept of the understanding (here the category of quantity) determines appearances in advance with respect to their *what*, their encountering aspect, that as a consequence of this quality of appearances a quantity (in the sense of intensity) is possible, thus warranting the application of number and mathematics (WT, 218).

Therefore Heidegger writes “what is sensed as an encountering *what* can be brought to a stand mathematically” (WT, 219).

What is then to be underlined, Heidegger stresses, is that “Both intensity and extension...permit themselves to be ordered as numerical quantities” (WT, 216). The first two principles, the mathematical principles, are the metaphysical positing of beings as object whose objectification lies in their coming to appear, to be there for a subject, that is, in occupying a measurable space within the pure intuition of space, as extensive magnitudes; and as the intensities of qualities, what the object provides us of its whatness as sensations which are taken by the subject in the a priori category of degree, the quantity of the intensity of the quality, that is, quantifiable sensations coming to be in the concept of the magnitude of intensity.

This is “what” the objects are in their appearing to us, the degrees of the sensations of qualities, such as luminosity, color, sound, etc.. The mathematical principles lay at the base of any human knowledge, human experience, in that they are demonstrated as a priori and synthetic judgments. They are the conditions for objects of experience to be for us, and thus for true knowledge to take the form of mathematical physical science,

that is, objective knowledge. The mathematical principles are the ground for the justified, demonstrated, use of mathematics in the study of the objects of nature and thus our calculative reckoning of them.

Kant aims to demonstrate, not only that objects are amenable to quantification, but that their very presence for us, their appearing, stands in quantification. This happens in their being produced, brought forth in intuition and concept, in the correspondence of the *quanta* of the pure intuitions of space and time, and the category of *quantitas* (magnitude), of extension and degree, of the pure understanding. By having measurableness and quantity, to be fundamentally constitutive of beings' appearance to us, Kant then justifies that the analytical statements of mathematics can and indeed must be applied to our knowing of objects.

With the first two principles, Kant demonstrates not only the possibility of using mathematics, numerical calculation, in learning about objects, i.e., about beings, but its necessity, since the category quantity of the pure understanding allows the objects appearing in the initial mathematical representing.

The always, already operative coming together of perception and understanding in the mathematical principles is the first step of human cognition as mathematical physical science. The appearing of objects happens in the a priori forms of intuition, the *quanta continua* of space and time, and the a priori, synthetic *quantitas*, the category of magnitude: so the objects appear, become truly available to a human subject for a possible further knowing, which is then to employ mathematics.

Heidegger writes that

Because the appearances come to a stand as an against-ness (*Gegenhasftes*) in general and in advance only upon the ground of the anticipating collection, in the sense of the concepts of unity (categories), quantity and quality, therefore mathematics is applicable to objects. Therefore it is possible on the ground of a mathematical construction to meet with something corresponding in the object itself and to prove it by experiment (WT, 223).

The presence of any object whatsoever in appearance, in Being, happens in the innermost relation of the form of intuition, the *quantum* of space, and the a priori category of the first two principles, quantity, which synthesizes that which appears in the manifold of space in the unity of the representing consciousness. The appearing of objects to a subject happens in the circle of the sizableness of space and the discrete measurements of the quantity of extension and degree of intensity of any object, thus the application of mathematics is rendered necessary by these mathematical principles, by these metaphysical principles.

These principles, then, demonstrate that the application of mathematics is the sphere whence any proper knowledge of things is to be pursued. The use of mathematics is the proper, the necessary-in light of the principles, approach to the knowledge of beings as objects, that is, of objective knowledge.

The appearance of objects resolves in the unifying category of magnitude, the *quantitas*, the measure of extension and the measure of intensity, belonging to the pure understanding and fundamentally corresponding to the *quanta*, the sizeableness of the pure intuition of space. Thus mathematics is the language that is to be applied for any true knowledge of the objects of nature.

In Heidegger's hermeneutic, Kant completes Descartes' meditations on the mathematical foundation of modern science, that is, of the mathematical as the ontology that is formative and normative of any knowledge. Kant demonstrates “the mathematical

projection of nature” and thus the necessary use of calculation for any knowledge as human knowledge proper.

The ontological possibility of objective knowledge as mathematical knowledge is staked in the projective capacity of the faculties of the mind. In the a priori possible quantification of space and time, and the a priori yet synthetic categories of quantity, of extension and intensity, thus conditioning the possibility of any further objective statement to proceed, as human cognition proper.

In this fundamental position, the mathematical projection of nature is established as the ground for any knowledge that is true, i.e, scientific knowledge.

In the context of Heidegger's history of Being, this also means that beings which become objects in human representing lose their independence, the self-gathering of their nature. Their being, their nature comes to be underlined by the cognitive capabilities of human representing, which resides in the subject, as the I-principle, the *cogito me cogitare*, who underlies as the ground the knowledge regarding the very nature of beings, that is to say, it produces, it brings forth the Being of beings, through its cognitive power of perception and thought, mathematically conceived.

The conditions of true knowledge reside in the Synthetic Principles of the Pure Understanding, and the pure intuitions, which are a priori, that is, already present in a subject before any experience, and yet synthetic, in that they are formative of the perceptual reception of that which against a subject stands, the objects of experience.

The principles are the conditions of experience, in which a subject knows, that which itself is not, objects: the conditions for attaining objective knowledge. The

transcendental system lies at the base of any experience, in that it clarifies, it elaborates upon the existential rapport of subject and object. The condition of knowledge, of true knowledge, of knowledge that is objective happens in the coming together of the Transcendental Aesthetic and the Transcendental Logic, demonstrated in the analytic of its synthetic *a priori* principles.

For Kant, the Being of beings lies in our capacity to know, this is articulated by Heidegger as “an intuiting [perceiving] determined in accordance with thought”; an intuitively-thought representing. What allows the disclosure of Being, and so the Being of any beings, is no more *phusis*, emerging out of itself in the multifold of beings, standing and abiding in the *logos*, in the self-gathering of beings; now, Heidegger writes, “Kant says: ‘We may now characterize it [the understanding] as the *faculty of rules*’” (WT, 188). Furthermore, now the pure understanding, Heidegger writes “is not only the faculty of rules,’ but even the source of rules” (WT, 188). The form and matter of any being that is, their presence, happens under the rules of the pure understanding.

Heidegger writes, summarizing Kant positing, that “this presence...is made possible *with* the participation of the pure understanding. Its activity is thought. Thought, however, is an “I think”; I represent something to myself in general in its unity and in its belonging together...The presence (*Prasenz*) of the object shows itself in the representing, in which it becomes present *to me* through the thinking...” (WT, 188). Being means to be represented by a subject; Being is representedness; Being is human cognition that represents calculatively.

For Kant all that is possible for human to know resolves in that which is available to our sensibility as structured in the categories of thought, both of which underpin the

very intellegible appearing of objects, so any further knowledge can proceed from this ground. What is real is what appears in space as extension of shape and intensity of sensations. This is what is firstly available of the objects, as objects, in their appearing to a subject, that is, what the subject holds in itself already so that the appearing objects can appear as they do, and be studied by mathematical physical science.

Yet the subject did not create these objects, the objects before their appearing in objectification in the category of magnitude and the form of space, are, for Kant, things-in-themselves, things produced in the knowing intuition of the divine, an intuition that is creative in its knowing, a creative knowing; in that it produces what it pro-visions, a direct intuition that creates. This first and absolute intuition brings forth what lies before the human, but for Kant, the product of this direct intuiting which lies at the base of any appearing, the things as they are for themselves and in themselves, is not available to the human.

Our intuition finds something that is given to it, it receives that which is already before oneself, the objects of the world, and thus it necessitates another step, understanding, the spontaneity of thought to complete the knowing of objects. In other words, for Kant too, then, the human faculties of cognition are understood, in view of a creator God; yet, at the same time, there is no role for God in human knowledge as mathematical knowledge.

The things are, for us, as objects the extended shapes and the intensities of the sensations, which they offer to our senses, they cannot be known by us but in their coming to stand-against us in what they offer to us in the againstness of perception and in the coming to a stand in the understanding. This is what is available to us. Kant writes

”For sensuous perception represent things not at all as they are, but only the mode in which they affect our senses; and consequently by sensuous perception appearances only, and not things themselves, are given to the understanding for reflection” (Kant 1783, 38).

Heidegger clarifies that

To Kant, the character of the ‘in-itself’ signifies that the object is an object in itself without reference to the human act of representing it, that is, without the opposing ‘ob’ by which it is first of all put before this representing act. ‘Thing-in-itself’...means an object that is no object for us, because it is supposed to stand, stay put, without a possible before: for the human representational act that encounters it (PTL, 174-175).

With the subsiding of Catholicism, and that means of the personal creator God from any involvement in the proceedings of the true knowledge set by science, the moment of the thing-in-itself fades away. By excluding the thing-in-itself from human knowledge proper, Kant also speaks against the tradition in which thought only, in judging, in the assertion, participates and can know the "essence" of a thing, what a thing really is, that is, things as they are in themselves and given in the partaking of human reason with divine reason.

For Kant, thought is necessary in that, since our cognition is based on perception, and our perception is limited by what it gathers in sensations, then it needs thought to have complete knowledge of the objects. Now the thingness of the thing is no more the presence, the existence of the essence of any being thought in the creative thought of God and accessible to the human, or as articulated in the pre-Kantian philosophy as “a determinateness belonging to the true essence of something, and posited as such” (WT, 214), that is to say, a definition out of pure reason. How things are in themselves is a question that our judging cannot answer.

Knowledge as human knowledge, it is no more a question regarding the beings as

they themselves are in themselves, about their essences; but about the beings that are in their being available to us, gathered in sensations and concepts, within pure intuition and pure understanding, that is, within the quantifiable, continuous wholes of space and time and the categories of the principles, that is, the mathematical projection of nature.

All that is available to human knowledge proper, are such conceived appearances, which are not the objects themselves but the way they are known in the initial representing of mathematical physical science, that is, in perception and thought as delineated in the axioms, in the mathematical principles. All of this is formulated quantitatively, mathematically, that is, the in advance positing of the sizeableness of space and time and the category of quantity.

In this sense, then, Heidegger points out, the things as they are for us in the immediacy of their straightforward perception disappears, in the sense that it stops having standard relevance to knowledge. In the grounding of modern science as mathematical, the simple presence of things before any mathematical objectification is carried, is decisively set aside from the sphere of the truth.

Heidegger writes

What stand as object in the world becomes *standing* in representational production...But what is present is present in a representation that has the character of calculation. Such representation knows nothing immediately perceptual. What can be immediately seen when we look at things, the image they offer to immediately sensible intuition, falls away (WT, 124).

The mathematical projection of nature, ahead of and over any experience, projects its possibility in the calculative approach to and over all of nature, an approach that is not based on an account of straightforward observing, but on one that skips over any reflection about this simple being there of things in their ordinary presence. And yet this

calculative approach claims its prerogative over any other understanding of Being, in that it is now grounded in perception itself, justifying that only that which can be measured is real.

Against the ancient straightforward sensuous apprehending of beings, against the doctrine of the knowledge as the partaking of the essences of beings, now knowledge does not and cannot know the essence of things, that is, for Kant “the object in itself always remains unknown” (Kant 1783, 46)). Only that which is available to us in the calculative presentations of categorical perception (that is a perception that is fundamentally mathematical) can be known, either directly or indirectly, like the phenomenon of magnetism, that is, through the measurements of instruments.

The metaphysical positing, which aims to articulate the Being of beings so that modern science can validate to itself its possibility to be the conduit for knowledge proper, skips in this articulation any consideration regarding the immediateness of our living; experience, in the proper sense is for Kant mathematical representing. The realm of experience in which we always already find ourselves to be, before any mathematical calculation, in the unfolding of our lives becomes the merely “given” before any mathematical representing begins. The straightforward perception of beings, their immediate presence to the human: the realm of Being whence any question of knowledge is bound to arise and its answers to refer to, recedes from the sphere of the truth, it becomes the merely “given”.

In this sense then Heidegger provocatively writes that

Where, however, the thing and the body are represented as extended and resisting things, as in modern mathematical physics, the viewable manifold sinks to one of sensory givennesses. Today the given for experimental atomic physics is only a manifold a light spots and streaks on a photographic plate...Fortunately, there first still exists (apart from

the light waves and nerve currents) the coloring and the shine of things themselves, the green of the leaf and the yellow of the grain field, the black of the crow and the gray in the sky. The reference to all that is not only also here, but must be constantly presupposed as that which the physiological-physical inquiry breaks up and reinterprets (WT, 210).

So that, he continues “The question arises as to what more truly is..., that crude chair with the tobacco pipe depicted in the painting by Van Gogh, or the waves which correspond to the colors used in the paintings, or the states of sensation which we have 'in us' while looking at the picture?” (WT, 210).

In other words, as Heidegger points out, in daily, factual living we do not find optical impressions or other such neurological stimuli, which of course does not in the least preclude their study, but closer to our own being we find the immediate straightforward perception of that which is perceived, that is always a direct perception of a something; before any fact regarding the light-years starlight had to travel to get here and hit the retina of a human eye, there is the twinkling glow of stars in the night sky, an event open to be interpreted scientifically, that is, mathematically.

To recapitulate, the possibility for mathematical knowledge, that is, for knowledge that is objective, that is of the object, objects must appear in the coming together of the *quanta continua* of the pure intuition of space, and the category of magnitude, quantity of the pure understanding, of extension and intensity. Thus things *are*. That means that they appear, they manifest as a measurable extended shape, relating in spatial determinations to other extended shapes, as beneath and above, in front of or behind, right or left. Filling their own space, the objects present a perimeter relative to other objects, from which luminosity, colors, sounds, odors, etc., reach us as sensory data in the degrees of their intensity. After this appearing, articulated in the mathematical principles, after the ob-the “againstness”, that is, the appearance of the object as extensive magnitudes in space, and

what is real in it, the degrees of intensity of sensations, thus appearing to a subject; the object comes to a stand in the dynamical principles.

4.12 The Dynamical Principles

The first of the Dynamical Principles refers to the constancy of the object, that is, after the object has appeared, the object stands, and this standing happens in time, that is, in the form making possible all the connections of the appearances of the objects.

Heidegger writes that in the dynamical principles “It is a question of a conjunction of appearances with respect...to their presence”, (WT, 225) which happens in relation to time, in time relations. This connectivity in general, the possibility of any further connections of appearances, their stability, happens in time.

Heidegger quotes a passage in which Kant writes that

Space is the form wherein all outside appearances encounter us. Time, however, is *not* limited to these; it is also the form of inner appearances, i.e., the appearing and the succession of our mode of relation and experiences. For this reason time is the form of all appearances in general. 'In it alone is actuality (i.e., existence, presence) of appearances possible at all.' (A 31, B 46, *N.K.S.*, p.75) The existence of each appearance, as existence, stands in a relationship to time...Time itself does not alter, but only something which is in time (WT, 231).

That is, time is the form that makes possible the connection of all appearances in advance.

The first principle of the Dynamical group, the Analogies of Experience, pertains with the time relations of that which has appeared. Now, that which has appeared comes to stand in time-relations, that is, analogies in time, which is a condition for their stable standing in human representing. After objects have appeared, they now come to a stand

versus a subject and each other in time. Heidegger writes that "Kant designates three modes of time: duration, succession, and co-existence" (WT, 231). The Analogies pertain to the fundamental relations of perception and thought that permits the rise of experience as such, as objective knowledge.

Heidegger writes that the principle of the Analogies of Experience reads "*Experience is possible only through the representation of a necessary connection of perceptions* (B 218 N.K.S., p.208)" (WT, 228). This connection of perceptions happens in relation to time, that is, Heidegger writes, "since an object can stand in relation to time with respect to its duration and with respect to the sequence in which it occurs with other objects and with respect to its being at the same time another, that is, the standing of objects is determined in their relations of permanence, of succession, and of co-existence" (WT, 234). Thus Kant distinguishes "three rules of all relations of appearances in time with respect to their relation in time" (WT, 229).

The first two principles, the mathematical principles, deal with the against-ness of objects, that is how objects show up at all for a human subject. Once objects have showed up as extensive magnitudes and as intensities of sensations in the quanta/quantum of space, their standing there in presence, the condition for their stable standing, their constant presence for a subject happens, according to their relations to time and to each other in time according to the rules of the Analogies. The third principles are analogies, principles of correspondence, of relations in time, Analogies of Experience. Heidegger writes that "Since these relations must represent and include in advance all objects capable of coming to appearance in any way, they can only be relations of what is inclusive of all appearances-namely, relations of time" (WT, 236).

These three rules are: (WT, 231)

1-The principle of Permanence which reads “All appearances contain the permanent (substance) as the object itself, and the transitory as its mere determination, that is, as a way in which the object exists (A 182, N.K.S., p.212)” (WT, 232). After the objects has appeared as an against, an extended shape of intensive qualities, its standing relates to its enduring, the permanence of the object happens in its permanent standing in time. That which remains after all transitory determinations have been sorted out is the *substratum*, that is, substance, all appearances are subsumed under the concept of substance, which is the concept of a thing foundational for all the determinations of existence. The concept of substance underlies in advance all that which has appeared in space and time and stands there in presence, that is, enduring in time.

2-The principle of Succession in Time, in Accordance with the Law of Causality which reads “All alterations take place in conformity with the law of the connection of cause and effect (A 189, B 232, N.K.S., p.218)” (WT, 235). The coming together of perceptions and concepts, the objects, undergo alterations in time, these alterations stand under the concept of causality, of an effect brought about by a cause. In that the objects' standing in time as substances changes and alters in time, these successions necessarily happen under the law of causality, thus the necessity of causal relations determines in advance the possibility of specific causal relations. Any statements of causal relations, as objective knowledge, is made possible under the law of causality, the second principle of succession in time. Kant writes “Everything that happens, that is, begins to be, presupposes something upon which it follows *according to a rule* (N.K.S., p.218)” (WT, 235), the law of causality.

3-The principle of Co-existence, in Accordance with the Law of Reciprocity or Community; which reads “All substances, in so far as they can be perceived to co-exist in space, are in thoroughgoing reciprocity” that is “as far as they co-exist stand in thoroughgoing community, that is, in mutual interaction (A 211, B 256, N.K.S., p.233)” (WT, 235). In that the substances are perceived to exist at all in space, they stand in reciprocal relations to each other, they affect each other. Kant writes in the *Prolegomena*, that in this principle “The appearances are subsumed under the concept of community (action and reaction)” (Kant 1783, 55).

The first principles, the two mathematical principles, and the first group of the dynamical principles, demonstrate how perception and categorical thought come together in the appearing and standing of objects, that is, how objects manifest in the unity of the I-consciousness by the categories of the mind and the forms of space and time. The constant presence of any object happens in the forms of space and time and the a priori synthetic categories of the principles; by quantity as extensive magnitude, by quality as a degree of intensity; and by the categories of relations in time, the permanence of substance, cause and effect, and action and reaction.

Heidegger, recapitulating what the demonstrations of the first three principles (the categories of quantity, quality and relation) aim for, writes that

In the axioms of intuition it is demonstrated in what sense quantity (as extensive magnitude) belongs necessarily to the nature of the object as something encountering. / In the anticipations of perception it is demonstrated how quality (reality) determines what encounters in advance as an encountering. / In the analogies...it is demonstrated in what sense the object with respect to its constancy can only be determined on the basis of a previous view of the relations in which what encounters (the appearances) stands (WT, 236),

that is, in the time relations-the permanence of substance, causality, and co-existence

(action-reaction).

These three categories of quantity, quality, relation, and the corresponding principles Heidegger writes

have this in common: they determine in advance what belongs to the factual nature of the object as something encountering and constant. With regard to these categories, these three groups of principles show that (and in what sense) the categories constitute in advance the factual nature of the object, its thinghood (*Sachheit*) as such and as a whole. These three categories are the realities of the nature of the object. The corresponding principles prove that these categories as these realities make the object (*Gegen-stand*) possible and belong to an object (Objekt) as such. They show that the categories have objective reality (WT, 237).

Here lies the ground of the metaphysical stance of modern mathematical science, of knowledge as objective, as explicated in Kant's work. Heidegger writes that "The principles so far discussed constitute the foundation through which a horizon is first formed at all, within which this and that and many can encounter and stand in connection as something objective" (WT, 237).

The last principle, the second dynamic principle, the Postulates of Empirical Thought as Such, does not deal with, Heidegger writes, "the factual content of the nature of an object" (WT, 237). The objectivity of the object is an intuiting representing that is grounded in the demonstrable and thus possible connectivity of the pure intuitions of space and time and the synthetic categories of the pure understanding (quantity, quality and relation); the second dynamic principle is without demonstration then because it does not want to demonstrate the correspondence of the reciprocally formative character of the concepts of the pure understanding and all that is intuited directly or indirectly within the forms of pure intuition, that is, about the content of the presence of beings, coming into being as mathematically represented objects. Instead the postulates, Heidegger writes, "correspond to the nature of that through which objects are definable at all: the nature of

experience” (WT, 238).

The Postulates of Empirical Thought as Such are special categories in that they are the fundamentally determining categories of beings' presence, that is, of their possibility, actuality or existence, and necessity. They are the ultimate and so foremost categories in which the modalities of the existence of objects are delineated, and this happens in view of the other principles. In other words, human representations of objects asserted in judgments, can be asserted as possible, actual, and necessary: these are the modalities of any asserting regarding objects. And this comes to be decided in the reciprocal interplay between the first three principles and the last.

The Postulates are the formal structures of any judgements regarding objects, the postulates underlying any empirical thought, any empirical judgments. They pertain with the ”*modus*, mode, manner” the how of objects' existence, their status in relation to Being, to existence; how they relate to experience, as the level of availability to a knowing subject, that is, to experience, and that is, human knowledge (WT, 237). These modalities define the empirical state of objects, their existence in relation to the assertions of the representing human; that they are possible, actual or existent, and necessary. Heidegger writes that “The postulates correspond to the nature of that through which objects are definable at all: the nature of experience” (WT, 237).

The postulates elucidate the how, that is, the modalities of the objects' existence, which happens in the relation between the subject, to whom the categories of modality belong, and the objectivity of the objects as determined in the first three principles. Thus the last principle pertains with the unification of what has been demonstrated in the first three principle and the nature of existence itself, i. e., the modalities of the existence of

objects.

The postulates, Heidegger writes, “assert something of how the concept of the object is related to its existence and the mode of its existence, that is to say, according to which modes the existence of the object is to be determined” (WT, 238).

The last principles, the modes of the objects' existence, are connected with the first three principles in determining the status of existence of objects, if objects are possible, existent, or necessary. In this sense the last principle is 'superior in rank', yet, Heidegger writes, “the modalities are determined only in relation to what is posited in the preceding principles” (WT, 241).

In other words, possibility, actuality, and necessity are the highest categories, these categories are the fundamental concepts that permit objects to come to be by being represented by a subject. Heidegger writes that the modalities “put the whole nature of the object as determined by the three first principles into its possible relations to the subject and to its modes of intuitively-thought representing” (WT, 241). The appearing and standing of objects for and in human representing is determined in the first three principles, which then provide for the guidelines of the categories of the last principles. Heidegger writes that “Conversely, the modalities are determined only in relation to what is posited in the preceding principles” (WT, 241).

Furthermore, Heidegger writes, “Possibility, actuality, necessity are understood out of the relationship between our capacity to know (an intuiting determined in accordance with thought)” the first three principles “and the conditions of the possibility of objects-conditions which lie in our knowing capacity itself” (WT, 240), that is, the last group of principles. The systematic interplay of the four group of principles is the ground

for all experience, that is, that which guides, rules over the true knowledge regarding the objects of nature.

In other words, the first three principles and the fourth prescribe the circular, self-grounding nature of experience as a whole, human knowledge as such, that is, scientific knowledge; the transcendental system of the conditions for experience as human knowledge.

With Kant's work, the new horizon opened by Descartes when Being is equated to human representing, is further articulated. The ground of knowledge is still the I-principle, but not as for Descartes out of purity of reason alone, out of thought alone, but out of the *proven* correlation of the human faculties of cognition, of conceiving and perceiving, to all the objects of nature, as they indeed presents themselves to our senses and are made sense of under the principles of human cognition as such.

4.13 Transcendental Philosophy: the Principles as Universal Laws of Nature and as such Conditional for the Laws of Modern Physics.

For Kant, the grounding of knowledge happens in the subject, in the forms of the pure intuitions and the Synthetic Principles of the Pure Understanding, these are a priori, that is, already present in a subject before any experience, yet synthetic, in that they are formative of the first perceptual receiving of things, of that which against a subject stands, objects. These principles are the conditions for experience, by which a subject knows, that which itself is not, objects. They are the conditions for the possibility of attaining the knowledge of the objects, that is, of any objective knowledge.

These principles are for Kant the conditions of all judgments in general. Kant writes that the principles “which contain the a priori conditions of all synthetical and necessary judgments, accordingly constitute a transcendental system” (Kant 1783, 53). The transcendental system lies at the base of any experience, in that it elaborates upon the ontological rapport of subject and object, and permits their correlative stand in existence, in Being. That is, it elaborates the conditions for knowledge, for true knowledge, which now must be objective, which means calculable. Knowledge is grounded in the coming together of the transcendental aesthetic and the transcendental logic, the transcendental system of all nature as conceived and experienced in modern mathematical physics.

The faculties of human cognition are the conditions for experience, that is, the conditions for the possibility of objective knowledge in the statements of mathematical physical science. They are the basic knowledge that guides, in advance, all the empirical researches of the sciences. Any specific knowledge of nature happens within the conditions for the possibility of such knowledge.

In other words, the transcendental system articulates the Being of beings, the thingness of things, the objectivity of objects. Nature is studied by modern science on the foundation of the first (mathematical) and second (dynamical) group of principles within the forms of the pure intuitions of space and time.

The ground for the claim to establish the laws of nature by modern science involves the very law-like foundation of the appearing of objects in the mathematization of the Being of beings, as objects of the “representational production” of the subject. Kant aims to articulate the “initial representing” ruling over all further representations, so

that, in this sense the principles are then, for Kant, what rules over nature, that is, over the Being of beings.

Regarding the principles, Kant writes that "Judgments, when considered merely as the condition of the union of given representations in a consciousness, are rules. These rules, so far as they represent the union as necessary, are rules *a priori*, and, in so far as they cannot be deduced from higher rules, are principles" (Kant 1783, 53).

The principles are the rules, the highest conditions for all empirical judgements, for scientific statements, that is, they render, Kant writes, "the empirical judgment objectively valid. These are therefore the *a priori* principles of possible experience" (Ibid., 53). Thus, Kant writes, "The principles of possible experience are then at the same time universal laws of nature which can be known *a priori*" (Ibid., 53).

The principles are universal laws of nature. The principles, in their cognitive power, let that which is perceived, the intuited as such, nature, the external objects come to appearance and be known by a subject, they manifest nature, all natural phenomena as objects available for a possible, actual or necessary mathematical representation, that is, for instance, the laws of physics.

The principles determine what nature is, as available at all to a subject, so that it can be studied by mathematical physical science. Kant writes that "the principles, by means of which all phenomena are subsumed under these concepts, constitute a physical system, that is, a system of nature, which precedes all empirical knowledge of nature, and makes it possible. It may in strictness be denominated the universal and pure science of nature" (Kant 1783, 53-54).

The principles constitute the physical system determining nature as nature, that is to say, a unified conjecture, the system of the principles projects a conjecture, in the old sense of the word meaning “to throw together” (from *com-* “together” and *jacere* “to throw”), regarding the objectivity of all the objects of nature, thus it projects the conditions for the possibility of any objectively valid judgment, such as the laws of mathematical physical science.

These laws abide to the ruling of the principles, to the lawfulness of the a priori categories of the principles of the pure understanding: quantity, quality, relation, and modality, and the priority of the forms of the pure aesthetic. The laws of physics, for instance, the laws of motion which account for the motions of all objects, are themselves possible by the principles of the transcendental system of all nature, the universal laws of nature.

The metaphysical grounding of modern science, in the essential articulation of the *Critique of Pure Reason*, renders nature as a physical system. Physics becomes the ground where all questions are to be directed, systematically, within such an opened horizon, such an understanding of the Being of beings, that is, of the objectivity of the objects.

Modern metaphysics, the ontological stance regarding the question of Being, finds its articulation in the transcendental philosophy, in the transcendental aesthetic and transcendental logic, which reveals nature as a physical system, the physical system of all of nature. Nature is understood as physics, in the law-like propositions regarding nature understood as a physical system of different domains, of matter, of light and heat, of electro-magnetism, and the forces/energy pertaining with their motions and interactions.

Nature is the laws of physics which are clarified in theories and demonstrated in experiments, all this grounded in the eminent subject, the scientist.

With Kant, metaphysics becomes transcendental philosophy, through which metaphysics becomes physics, in that metaphysics disappearingly flows into physics. The question regarding the ground of science itself, eventually, comes not to matter any more, it becomes obvious that mathematical science is the pathway to universal knowledge; for Nietzsche, as articulated below, this is completely obvious.

In other words, with the successes of the sciences that which is foundational for science, its metaphysical stance, the ontological ground of science itself becomes unquestioned and covered up, while the building of modern science in all its branches is erected and developed.

Now, any metaphysical questioning, ontology, that is, for Heidegger, the question regarding the Being of beings and Being as a whole, in the modern answer of the subjectivity of the subject and the objectivity of the objects, is seemingly forgotten and not engaged questioningly anymore. Now human knowledge proper looks for mathematical law-like formulations in physics, in biology, in astronomy, etc., supported by the theories and the experiments in all their researches.

Kant, instead, asks the question of the ground of modern mathematical science itself, that is, what is nature so that it can be studied by modern mathematical science? Kant finds this pure knowledge of nature in the rules structuring human knowledge as such: transcendental philosophy.

The mathematical and dynamical principles are a-priori to experience, yet are, at the same time, synthetic in that they prepare the way things encounter us, in perception,

they allow experience to be. They provide the basic, originary ground for human experience, and this means scientific knowledge of nature, of the universe; they are the conditions for the possibility of mathematical physical science, they are the conditions for the possibility of the law-like propositions of science.

Lewis W. Beck, the editor of Kant's *Prolegomena*, writes in the introduction that

The result of this organization of sensuous experience by the understanding is *nature*, which is 'phenomena under laws' given by the understanding. These laws, necessary for there to be any objective (that is, intersubjective) experience, are not *derived* from any experience, but are *a priori* functions or rules of the understanding which *apply* to all our experience" (Kant 1783, xvi).

So that, he continues, "The principles, or *a priori* synthetic judgments, are universal judgments which are based on the categories and apply to the world of experience—that is to empirical phenomena in space and time. These are the laws that the understanding 'legislates' for nature, considered as organization of experience" (Ibid., xvi).

In other words, it is upon the ground of the transcendental system of principles as that which legislates for nature, that nature can become knowable to the human being through all the empirical laws of science, for instance, of physics. Kant writes, in the *Critique*, that "Empirical laws can occur and can be found only by means of experience; and this, moreover, in consequence of those original laws through which experience itself becomes possible in the first place" (Kant 1781, 281).

In this regard, Heidegger writes that

Kant distinguishes between rule and law. Rule is derived from the Latin *regere* [to lead, to rule, to plumb-line, to regulate]. As he notes: "The representation of a universal condition, according to which a certain manifold can be posited in uniform fashion, is called a *rule*, and when it *must* be so posited, [it is called] a *law*" [*Critique of Pure Reason*], A.113 [p.140] (ZS, 26).

These rules are the fundamental principles which regulate beings in what beings

are, not in themselves, but as they appear to the finiteness of human cognition, that is, perception and thought, which upon these principles can then produce objective representations. The principles are the rules as conditions for the possibility of the Being of beings, of the objectivity of objects, thus giving ground, that is, justification, for all the law-like propositions of science, as representative of natural phenomena. Nature is the conformity of phenomena in space and time to laws.

On the ground of the the mathematical and dynamical principles lays the possibility of the laws of motion in the sense of the mathematical formulas representing the motions of any substance and the forces dynamically causing them in the quantifiable field of the coordinates of space and time, in which the numerical determinations of such motions are determined, that is, measured.

The fitting of the emirical laws-the laws of motion, to the *a priori* synthetical principles justifies the possibility of the laws of physics regarding all motions, that is, that they have objective validity. Their objective reality is justified by fulfilling the conditions of experience, the principles, the rules that the human understanding legislates for nature: the transcendental system of nature as delineated in the mathematical and dynamical principles.

The laws of motion, as conceived by Newton, now find their ontological justification upon the transcendental system for all knowledge, the rules upon which empirical laws can be stated. Thus, as the laws, these can legislate in advance, regarding all the phenomena of motion, that is, of moving objects in time and space. In other words, the principles dictate, regulate, provide the guidelines, the “rules“, the formal structures provisioning for what is to be counted as an object at all, and for how representations of

objects must be connected in judgments, in the modalities of the objects' existence, for instance, in necessary causal measurable connections: the laws of motion, that is, the mathematical formulations of laws.

4.14 The Mathematical Projection of Nature: How Nature Ought to Be

For Heidegger, transcendental philosophy is a further articulation of modern metaphysics, as the mathematical projection of nature. In Heidegger's hermeneutic, with Kant, the archaic sense of *logos* of pre-Socratic philosophy or of the Scholastic tradition completely disappears, as it now becomes logic, *ratio*, reason, the discursive thinking-perceiving faculties of the human established as ruling over all nature in demonstration.

The subject, the *sub-stratum*, that which lies under, is no more each and every being abiding in the *logos*, the word of the divine, or the archaic Greek *logos*, as that which gathers beings as the beings that they are, at the same time gathering the human being itself to their encounter.

Heidegger interprets that, starting from the later Greeks on to modernity, the subject, that which lies at the base, becomes specifically understood as the eminent subject, the human being, properly understood as a thinking being, as a rational being. A rationality that is first divinely shared (late Scholasticism) then transforms, at the beginning of modernity (Descartes) by becoming autonomous and self-sufficient.

The completion of this transformation is Kant's work of grounding knowledge in the cognitive faculties of the human. That which stands under all true knowledge is mathematical representing, calculative thought. Being means to be represented by a

subject. Being is representedness.

Mathematical representing comes to underlie and ground Being itself. With modernity thought acquires ruling power over Being, now it is how Being *ought to be*. Since the Being of beings coincides with its being represented, and it is represented as it is perceived, and in that this perception, as the ground of the human faculties of knowing, is mathematical, then that is how Being *ought to be*.

Heidegger writes that

For Kant, beings are nature-in other words, whatever can be determined and is determined in mathematical-physical thinking. The categorical imperative, which is determined both by and as reason, is opposed to nature. Kant more than once explicitly calls it the ought, considering the relation of the imperative to what merely is, in the sense of merely instinctive nature (IM, 212).

This means that when searching for knowledge proper, the human is not to be led by nature, but the human leads nature to answer all the questions that arise in the mathematical projection of nature, itself grounded in the *ego cogito*, in mathematical representing. Now mathematical representing determines how Being ought to be.

4.15 Being as Mathematical Representing

In the mathematical projection of nature, beings now fundamentally come to appearance, meaning they come to be, as objects, in the I posit of the subject. They are a posit, a position, a putting before oneself out of specific a priori and synthetic judgments, that is to say, a fundamental initial representing defining the actuality of the actual, that is, the objectivity of objects, and at the same time, the subjectivity of the subject.

For Kant, this comes to clarity in reflection, but is always already happening, the

already operative mathematical projection of nature, transcendental philosophy, is ground for modern mathematical physical science. The Being of beings, the objectivity of objects is posited by and in the subjectivity of the subject, in the appearing of objects to the categorical thought-perceiving of the subject, as the ground of any proceeding of each science.

The I think attains an eminent position in regard to the very appearing of beings. The "I think" becomes decisive in the very first appearing of the objects as to what they are, in the positing of the posited, as "I posit this to be such and so". In this a priori and synthetic projection of the principles of mathematical science, that is, in this ontological projection of nature, the articulation of what an object is, the objectivity of all objects, happens in its being represented in the mathematical projection. Beings as objects are open to be truly known in human representing, in a "representational production" of percepts and concepts, in a production that is essentially calculative.

Knowledge of the objects of nature can and must be produced in mathematical representing, which is not an arbitrary making up, but an abiding to the possibility of the mathematical projection of nature. Now, that which comes to appearance at all, the real, is to be reckon with mathematics, which will provide applicability to all that which shows itself in appearance and thus is, the phenomena of nature.

The possibility of knowledge, which in this context means Being, resolves in the realm of human cognition, human representing. In that I present to myself that which presents itself to me in the receiving of sensations, and which comes to an intelligible stand, in the priority of that which is already in me, the mathematical, the categorical thinking of the first axioms, the category of magnitude, thus is the knowledge of nature,

as physics, not only possible, but necessary.

4.16 The Requirement for all Scientific Knowledge: Synthetic Judgements A Priori, that is, Fundamental Assumptions

At the ground of any knowledge are the cognitive faculties of the human, conception and perception. At the ground of any knowledge, for Kant as for Descartes, there is the "I think". Yet with Kant, if pure reason, as mathematical reason, still governs over the proceeding of knowledge, it must explicitly account for perception, for the appearing of beings, the appearing in perception of objects to a subject.

With Kant, the circumscription of the Being of beings happens in a sharper delineation of the circle of the subject-object relation. That is, for Kant this relation is not rational metaphysics anymore, out of pure concepts alone. Now the requirements for any knowledge are still out of pure, mathematical reason, but must fundamentally account for the perception of the phenomena. Still, it is in the pure understanding of the subject, in the I think, that the pure categories bring about that which is to stand as object at all, thus articulating the original relation of subject and object.

The mathematical projection must let, in advance, but synthetically the sensuous appearing of beings as extended quantities and degrees of qualities, their appearing residing in their being represented mathematically. The principles are the conditions of such appearing, that is to say, of their Being. Now any further proceeding of knowledge is bound to this ontological definition.

In Heidegger's phenomenological hermeneutic of Kant's *Critique*, this is the

attempt to ground, that is, verify as valid, mathematical physical science as the proper way to learn of nature, in the sense that the use of mathematics is required by the way nature is understood to be, coincidental to the possibility of human knowledge proper.

This for Kant means that knowledge, as modern science, is fundamentally possible in terms of certain highest categories that are not drawn from experience, and yet they allow experience to become intelligible, that is, they are a priori and synthetic principles, of magnitude, of intensity, of substance, of causation, of reciprocity; so that the specific concepts with which we understand the phenomena of nature such as motion, force, energy, work, distance, etc., these concepts can and must be used to learn about natural phenomena with the use of mathematics, of calculation.

For Heidegger, Kant, like Descartes, aims to articulate the mathematical projection of nature, as the foundational knowledge for the validity of modern science, i.e., for Kant the justification for the application of mathematics to the study of nature. In other words, Kant aims to demonstrate that the possibility to know any objects at all is opened by the mathematical projection of nature, that is, the definition of nature as nature. For Kant, as for Descartes, the issue was to ground modern science not in its practical results, but in the articulation of the ground that sustains modern science itself.

The ground is the metaphysical stance that extends over all of beings, that is, as objects of mathematical representing. For Heidegger this cannot but happen from an in advance definition, that even if cannot purveys all beings, it must defines all beings in their Being, it must stretch over all beings, as the beings that they *are*, that is, in an understanding of their Being.

This understanding of the Being of beings guides all transactions with beings

when their truth is questioned and thus is a stake; and in that it guides, it must be present in advance in its making beings manifest as to *what they are*, thus opening the way for their encounter, that is, as objects of mathematical physical science.

Kant reflects upon the ground of the emerging modern science by clarifying the predetermination, the preoperative understanding of nature, of Being, at work for the possibility of modern science to be, beyond and before all practical results.

Kant meditates on the essence of knowledge. Kant articulates that the possibility of knowledge happens in advance of experience and yet providing with the fundamental grasp of the objects of experience. When Newton, in the first law of motion says *corpus omne... every body...*, Newton had not surveyed all bodies, that is, this law-like statement, all the law-like statements of modern science, stretch beyond what experience provides, but account for all the objects of experience that it addressees. In the same sense, Kant delineates in advance that which is common to all objects, their being mathematically representable.

That is to say, that in any knowledge, the knowledge of what nature is in general, and of all the specific domains of nature, Heidegger contends, fundamental assumptions are already operative which stretch over all the beings under scrutiny.

In this regard, Heidegger writes that

All hypotheses in natural science-already presuppose the positing of a determinate essence of the beings aimed at, and on the ground of this essence the working hypotheses first get their sense. Every 'hypotheses' presupposes...a prior positing of the essence. The productive seeing of the essence is the positing of the ground; it grounds itself in what it brings forth and it brings forth that in which it grounds itself (BQOP, 78).

That is, Heidegger contends that in any knowledge, that is, in all science, all the positive sciences look for what they must already have delineated in advance, what it is they are

studying, so that they can find the phenomenon, and probe it, precisely as it is so understood.

In other words, Heidegger writes, “science always encounters only what its kind of representation has admitted before hand as an object possible for science” (PLT, 168).

Again, in this regard, Heidegger writes that

When we approach the domain of the objects of a science, the objects of this domain are always determined such and so in advance. However, this does not occur accidentally nor from a lack of attention on our part as if this pre-determination of the object ever could be prevented. On the contrary, it is so necessary that without it we could not stand before objects at all, as before something according to which our assertions are directed and *on which* they are measured and proven (WT, 179-180).

A pre-determination of the object in general has to be established in advance so that any inquiry can proceed in the realm thus opened; that is, for modern science, the realm of the objective.

Heidegger asks “How can a scientific judgment correspond with its object? A judgment about art history is possible only when the object is defined as a work of art. How can a biological assertion about an animal be truly a biological judgment if the animal is not already pre-defined as a living creature?” (WT, 180).

He continues writing that “We must always already have a knowledge of content, of what an object is according to its objective nature, i.e., for Kant a synthetic knowledge. And we must have it in advance, *a priori*. Objects could never confront us as objects at all without synthetic judgments *a priori*; by these object we ‘then’ guide ourselves in particular investigations, inquiries, and proofs, in which we constantly appeal to them” (WT, 180). For Heidegger, Kant attempts to articulate the essence of modern science as this pre-determination of all the objects of nature.

Heidegger writes that

Synthetic judgments *a priori* are already asserted in all scientific judgments. They are pre-judgments (*Vorurteile*) in a true and necessary sense. How scientific a science is depends not on the number of books written, nor the number of institutes and certainly not on the usefulness it offers at the moment. Rather, it depends on how explicit and defined is its work with which it strives to do something on its pre-judgments. There is no presuppositionless science, because the essence of science consists in such presupposing, in such pre-judgments about the object. Kant has not only affirmed all this, but has also shown it, and not simply shown but also grounded it. He has set this grounding as a completed work into our history in the form of the *Critique of Pure Reason* (WT, 180).

The mathematical projection of nature, by which all beings become the objects for scientific hypothesis and inquires, comes to the fore as the understanding of Being to which any scientific proposition regarding objects has to adhere to, rigorously. For Heidegger, the rigorosity of science is this very adhering to the initial mathematical projection. The mathematical is the delienation of the field of Being where the truth regarding beings can and must be searched in the hyphothesis and researches of the sciences.

From the certainty of the firt axiom of all representing, that is, the I-principle, knowledge, that is, human knowledge, can proceed in the calculative reckoning of all beings as objects, in view of foundational principles and concepts which determine, that is, presuppose the nature of all beings as objects, predetermining the objectivity of the objects in a priori, synthetic propositions, principles, thus opening the study of all such objects.

In the same way, all the postive science are, themselves, to carry in advance, a predetermination, a fundamnetal representing of the Being of the entities of their respective domains, their ontological definitions (or 'ontic' definition, in Heidegger's more precise terminology), their a priori and synthetic propositions, which opens up and thus guides the direction of all experimental research in any given field.

In other words, science in general, and thus each of the specific sciences is never presuppositionless, and this presupposing, this assuming, what Kant articulates as these *a priori* synthetic propositions, is the most essential to any knowledge, for it opens the beings under scrutiny as to what they *are*, so that any research of questions can then proceed, in the direction opened by such ontological definitions, the basic assumptions regarding the beings under scrutiny.

Heidegger stresses the importance to consider and ponder such basic assumptions, these basic concepts, since this is the sphere where our sense of Being, of reality, of what anything is, is established and articulated. For instance, in Kant's attempt to justify the validity of mathematical physical science to study nature, that is, the modern sense of knowledge as objective; and also because this is the sphere where in each of the positive sciences, any true advancement is bound to happen, as Kuhn clearly articulates for specific sciences in *The Structure of Scientific Revolutions*.

The Being of beings, that is to say, the objectivity of objects, is defined in the calculable appearing of objects in space and time in human cognition. This is articulated by *a priori* synthetic judgements, which presuppose and justify why beings, as objects of human representing, are in their Being essentially prone to mathematical (numerical and geometrical) measurements and accounting.

To find such an object prone to truthfully respond to calculation, the objectivity of the object must be sketched and demonstrated first as a possibility of existence, i.e., of Being, for Kant, beyond what a straightforward and immediate perceiving of beings offers, yet grounded on a perception that is calculable in advance. In the *Critique*, Kant does demonstrate such a possibility in the articulation of the ground of any possible

knowledge, in human cognition composed of (intuition) perception and (understanding) thought, themselves essentially conceived as calculative.

4.17 The Mathematical Projection of Nature in view of the Archaic Greeks

In Heidegger's phenomenological hermeneutic of Western philosophy, the mathematical pertains to the understanding of the Being of beings which guides, that is, predetermines the articulation of the general understanding of all beings, wherein all further engagements and probing of beings happens. That is, the articulation of the most basic sense of reality of an epoch.

The mathematical is the pro-vision that guides in advance the approach to the question regarding the Being of beings. In this provision, beings are objects produced in the cognitive capacities of the human being, perception and thought, as they are delineated in the mathematical/dynamical principles. The principles articulate the basis for the mathematical representation of objects by a subject in modern science, giving cognition in general a specific characterization inclined toward calculation. This predominance of calculative thought will be further considered below.

Here will be briefly sketched Heidegger's considerations of the mathematical, as the modern understanding of Being, in the context of the history of the understanding of Being. In this context, Heidegger underlies that now Being is approached explicitly from the priority of reason, for Kant of thought and perception, that is, a cognition that is produced by the subject. In modernity, the subjectivity of the subject comes to underlie Being itself as the *ought*. Being ought to be as it is mathematically represented.

In this regard, Heidegger writes that

Henceforth, nature becomes *object (ob-ject)*, the object being nothing other than 'what is thrown over against me'...As soon as the ego becomes the absolute Subject, all other beings become objects for it, for example, in the form of perception (this is the point of departure for the 'Object' in the Kantian sense). What is decisive is that the subject-object distinction plays entirely in the dimension of subjectivity. / This dimension is characterized by Hegel through the expression *consciousness*. 'Consciousness' is the sphere of subjectivity. Consciousness, that is, 'seeing everything together,' *co-agere* (FS, 13-14).

As said before, Heidegger articulates that before this shift, that is, from ancient Greece to the late Middle Ages, "Everything that endures of itself and thus lies present is *hypokeimenon*. *Subjectum* is a star and a plant, an animal, a human being and a god" (TEP, 28). With Descartes, the subject acquires its modern connotation that is indicative of the eminent subject, that is, of man's surge against any authority. That which stands under and thus endures in constancy is no more experienced as the subjects, all beings that are, each in the constancy of its own standing, what stands as the preeminently constant is the thinking that represents to itself: human consciousness.

In every representing of something, the I-ness of the representing subject is also present as the ground of any representing, that is, representational thinking grounds itself on itself. Heidegger writes that at the inception of modern metaphysics "The demand for certainty goes after a *fundamentum absolutum et inconcussum*, a basis which no longer depends upon a relation to something else, but rather is absolved from the very beginning from this relation, and rests within itself" (TEP, 26).

The upsurge against the authority of the Scholastic tradition requires the search for a ground that is most certain, which is found in "the sphere of indubitable representational thinking" (TEP, 28). So that, Heidegger writes "Man...does not just relate through *faith* to God and to the world created by God. Man also relates to what is real

through the *lumen naturale*. In the natural light of reason, a certainty native to him must become authoritative if certainty decides about the adequate relation to what is real” (TEP, 24).

The equation that, for Heidegger, stands at the inception of all Western philosophy, the verse of Parmenides that Being and Logos are the same, this equation moves toward the predominance of Logos, modernly understood as rational thought, as mathematical thinking: Being, reality, now shows up, truly, only there. The subjectivity of the subject takes the self-asserted position as ground of any knowledge, in the self-restriction to the guidance of the mathematical rules of thought, of pure reason and its essential restriction, in pure perception and pure thought.

All that which is, the Being of beings, becomes objectified, for instance, posited as points of mass and the forces pertaining their motions in the quanta of time and space, in the possible knowledge that can turn to be objective, in the measurable results of the experiments. The mathematical projection of pure reason and its critique makes possible and thus provides guidance toward truthful knowledge, that is, objective knowledge. Now the human being is to take the lead, as Kant clearly articulates, in interrogating nature, which is now to respond to the inquires of the scientist in the experiment.

The question regarding Being takes in modern metaphysics the onto-theological structure that resolves in the objectivity of the objects, that is, nature as mathematical physical science, nature fundamentally conceived as a nexus of forces measurable in advance, physics; and the subjectivity of the subject, that is, the cognitive faculties of the human being.

Now the human being produces, brings forth in mathematical representation

grounded in transcendental philosophy the truth regarding nature in the theories of physics, of biology, of chemistry, of psychiatry, etc.. In such a producing of knowledge the human takes a stand, as the one being who, out of its own power is to enjoin Being in representations, thus securing its own stand in Being. The "I think in my mind", the thinking of perceptions, becomes the ground of any knowledge whatsoever.

Yet, Heidegger contends that the mathematical projection of nature does not cover completely and exhausts the meaning of the Being of beings. It is itself a possibility of understanding Being. And one that in articulating its ground oversteps a meditation on that first representing and perceiving in which we already stand and must stand, that intelligible nexus of meanings in which the things of the world manifest in the ordinary immediateness of living.

Galileo, Newton, Descartes, Kant overstep any considerations of the realm in which we always already dwell, the soft breeze, the green lawn, the trees dotting it, and focus exclusively on the apple falling, in view of velocity, of force, of a causality that can be stated in law-like, that is necessary, mathematical formulations valid everywhere and anytime, and indeed it can do so because time and space have themselves being rendered calculable, in advance, becoming mere parameters for all calculations.

But this conceiving of space and time, as calculable, indeed a valid one, it is one possibility of conceiving time and space. For instance, in the archaic Greek understanding of Being, Time is that which regulates the dwelling of beings, that is, the Being of beings. Time is *Chronos*, Time is the ancient father of even the highest of the gods, Zeus. Time lets appear and time conceals back into itself, all beings, allocating to each its own time. Time is understood by the Greeks, Heidegger writes, as "the 'right' or 'wrong' time, the

appropriate or inappropriate time, releasing beings to their time and taking them back (P, 141).

Heidegger writes, referring to a verse of Sophocles (c. 497/6 – 406/5 BC), that

Therefore time is called 'broad,' in view of its capacity, indeterminable by man and always given the stamp of the current time, to release beings into appearance or hold them back, number has no power in relation to it. That which dispenses to all beings their time of appearance and disappearance withdraws essentially from all calculation (P,141).

Heidegger points out that already with Aristotle, Time comes to be related to number, determined as the constant succession of now points, and this determination, he writes, has

dominated the Western understanding of time ever since; time becomes a factor, a parameter, a 'worker,' that 'works' either 'against' or 'for' man, namely 'against' or in 'favor' of the calculation by means of which man makes plans to master beings and secure himself in them. In modern terms, time is something man takes into account, and precisely as the empty frame of the progression of occurrences one after the other. Everywhere, not only in physics, time is the 'parameter,' i.e., the coordinates along which runs...all measurement...and calculation...Modern man, the subject to whom the 'world' has become a uniquely uniform 'object,' consumes even time. Modern man therefore always 'has' less and less time, because he has taken possession of time in advance only as calculable and has made time something of which he is obsessed, though he is presumably the ruler whose rule masters time. For primordial Greek thinking, on the contrary, time, always as dispensing and dispensed time, takes man and all beings essentially into its ordering and in every case orders the appearance and disappearance of beings. Time discloses and conceals (P 141-142).

For the archaic Greeks, Time is Fate, not as the pre-determined destiny but as that which lets beings appear, and recede from the appearing, while itself remaining inscrutable, especially to the calculations of the one being who itself stands, only for a while, within this disclosing of the present in appearance and disappearance, the constant appearing and disappearing of beings regulated by Time itself. In other words, it is Time that conditions the Being of beings, the human being included.

On the other hand, in modernity, Thought, reason understood as mathematical representing, becomes conditional for Being. Being becomes beingness, the

representation of Being. Eventually, Being is understood as "picture", as the picture of the world, as worldview. Here, according to Heidegger, there happens the reverse of what was true for the archaic Greeks for which, at least for the thinkers, Being was primary. Heidegger interprets that for the Greeks, Being resolves in the interplay of unconcealment and concealment, of appearance and disappearance, out of an originary concealment.

So that the unconcealment of any being included the concealment of Being itself, for example as the inscrutability of Time, as Fate. Being, Time, reveals; it let the manifold of beings to appearance and, yet, conceals itself. Heidegger interprets that the ancient Greeks experienced Being, at bottom, in concealment and unconcealment. The coming to appearance of any being is always understood from the background of concealment and unconcealment, as the light of day manifests and the darkness of the night conceals, to the disclosing attitude of the human, who itself stands in the unconcealment of Being, as the recipient of such unconcealment, in that the presence of beings, their truth, their essence unconceals in the works of the human being.

In view of this fundamental experience of Being of the archaic Greeks, that the sense of truth is still for Aristotle, Heidegger writes, "to adhere to the unconcealment disclosively in the saying and let appear...the disclosive correspondence expressing the unconcealed" thus "this correspondence takes and holds the unconcealed for what it is" (P, 49). In the translation of *aletheia* as *veritas*, as truth, the priority of the unconcealment itself disappears, eventually only the disclosing that asserts remains, that is, the subject that dis-covers. The unconcealment of Being now comes to pass in the representing that is ground for the Being of all beings, that is, as metaphysics, as first philosophy, as

transcendental philosophy, in the laws of mathematical physical science.

Now, in the new sense of truth as *veritas*, Heidegger articulates, “The rightness of an assertion is its adjusting itself to a right rightly instituted and firmly established” (P, 49); that is, for instance, the ruling principles established in transcendental philosophy. Thus the essence of truth becomes the positive proceeding of the asserting that corresponds, correctly, to the state of affairs it aims to assert about, which has been already opened up in advance as mathematically representable.

Heidegger writes that

This does not simply mean that culturally, in historiographical presentations of the Greek world, we no longer know and appreciate the early Greek 'concept of truth,' but it means something else, essentially different, something momentous, and for our history the only decisive thing: the entirety of beings has in the meantime been transformed in such a way that beings as a whole, and therefore also man, are no longer determined on the basis of the essence of *aletheia*. Consequently, as soon as we hear of concealment and the modes of concealing, we think immediately, and only, of modes of human activity man himself controls. We do not experience concealment and disclosure as events which 'come over' beings and man (P, 62).

With the end of classical Greek philosophy, and the later Romanization of all things Greek, the primacy of Being, in which beings come to appearance, to manifestation, that which rules over any presence or its withdrawal, and to which the human must abide in the very fact that the human is, as a being among others beings, within the unconcealment of Being, fades away. Disappearing completely when human representing becoming conditional of Being. In other words, in Grecian times, the human being is the being to whom Being, here meaning the truth, can reveal itself, in modernity the human becomes conditional for the discovery of Being, of the truth. Now the equation of Being and Logos is experienced so that Logos, Thought grounded in the human, pre-determines how Being ought to be. That is, in mathematical representing, in calculation.

4.18 The Mathematical Projection of Nature Grounded in a Perception that is Quantitative

The Modern Predominance of Calculative Thought and of Technology, and the Fading of Ontological Thought

The Current Technological Age as the End and Completion of Metaphysics

For Kant, the first *axioma*, the first fundamental principle is, as for Descartes, the *ego sum ego cogito*, the “I am a being whose essential way of being is to represent”, now specifically delineated in the cognitive faculties of perception and thought, delineated in the architectonic system of human knowledge, in transcendental philosophy. In the coming together of the pure intuitions and the mathematical principles are established, in demonstration, the fundamental presuppositions for all knowledge as modern mathematical physical science.

Mathematical calculation, that is, mathematics in the sense of the numerical, is to be applied toward the knowledge of the objects of nature, because the objects are assumed and demonstrated to come to a manifesting in a sensible perceiving, that itself is mathematical.

All natural phenomena manifest intellegibly within the rule of the initial mathematical representation, grounded in perception, so that the law-like formulations of science, such as those of physics can be proposed to account, numerically, for the regularity of necessary causal chain of events in natural phenomena.

Modern mathematical physical science is grounded, that is, justified by Kant, in the rules of the principles that the understanding “legislates for nature”. Thus arises the

possibility for proposing law-like propositions, as in physics, that is, as Glazebrook puts it, “The intent to order by means of law like hypothesis” (Glazebrook 2000, 91). The law-like hypothesis are possible on the very rule making quality of the pure understanding; and since the law-like hypothesis are projected in advance, then they must be demonstrated in the verification of the experiment.

Yet the modern experiment, the gathering of the empirical knowledge of beings, does not happens as with Aristotle, still out of a predetermined guiding understanding of the Being of beings, but one that must encounter and observe them as they manifest to us immediately in the experience of their presence; the understanding of the Being of beings guiding modern science overjumps that which is perceptually closer to us in ordinary experience, so that it must return to it in the experiment.

At the inception of modern science, the first scientists reject the grounding quality of perception for true knowledge, but on the model of the creativity of divine reason and the self-evidence and logical consistency of geometrical and mathematical knowledge, they project an understanding of natural phenomena, that, even if it has to begin from the way natural things present themselves in perception, they do not trust the senses as foundational for knowledge. That is, they experience nature in a understanding that is preeminently mathematical, geometrical, numerical, as articulated in the words of Galileo “Whoever wants to read a book, must know the language in which that book is written. Nature is a book and the characters in which it is written are triangles, circles, and squares”.

The guiding approach to the knowledge of nature is now mathematical. And the grounding of this overall approach, as articulated by Galileo, and especially by Descartes,

skips any consideration over that which is immediately present as perceived, but projects an understanding of the Being for all nature that is mathematical, even against sensible perception.

This mathematical projection of nature, thus, is founded upon pure reason alone, it is purely conceptual; and yet it accounts for that which is not conceptual, the objects of nature which are fundamentally available in sensibility. From here Kant's undertaking to ground the mathematical projection of nature to the very appearing of the objects to the subject, in sensible perception. This happens in the mathematization of space and time, and the mathematical principles, the a priori, synthetic principles, that the understanding legislates for nature, so that nature can come to a sensible appearing, that is calculative.

What is perceived, is perceived in view of the in advance mathematization inherently attributed to nature, and, at the same time, to human cognition, the circle of that which truly is: Being. But this is not obvious in mere perception, to mere observing. It is precisely to justify the mathematization of nature, in view of human cognition, that Kant aims to fundamentally relate perception with the mathematical projection of nature, as foundational for it.

In the *Critique*, Kant accomplishes this by demonstrating that the principles of the pure understanding are, at the same time, a priori, of the mind, and synthetic, of the object as they appear in perception. The objects appearing in their perceptual givenness in the quanta of space and time are correspondingly taken up and ordered in the prior, yet synthetic projecting of categorical thinking, of mathematical representing.

In the principles of human understanding, the principles do not put together in retrospect the intuited that comes to be thought in calculation. But the synthesis of the

intuited with the mathematical category of the pure understanding of magnitude, as extension and intensity, is immediate, that is, it is always already functioning, before any specific perceptions. So that, perception can and must be brought to relevance when the question arises to ground, that is, to justify modern mathematical physical science, that is, to justify the application of mathematics to the study of all natural physical objects, the physics of nature, as Kant aims to accomplish. The formula $V = d \times T$, velocity is equal to distance by time, finds its required objective reality, it can justifiably be applicable to the objects of nature

Now the mathematical “thinking over” of Descartes, the “I conceive in my mind” of Galileo obtain, in justification, objective validity, that is, the mathematical approach to beings does not come from mere concepts, innate ideas, nor does it reflect divine geometrical harmonies, as Kepler puts it, but from the very base of any knowledge, that is, perception, but the specific perceiving delineated in the mathematical principles.

Kant's reflection upon the ground of any knowledge finds perception, the being perceived of the objects is the fundamental step of any knowledge. Kant specifically posits intuition, perception-at the base of any experience-that is of human knowledge proper, delineating the scope of that which is humanly possible to know.

But this perception is such that, as Heidegger puts it, even before the object appears "we know it must have a measurable intensity" (WT, 279): calculation is on its way to establish its dominance in the decision regarding the question of the Being of beings. Calculative thinking takes the central stage as the fundamental approach to the knowledge of all the objects of nature, all beings, becoming the last judge in any dispute regarding the Being of any being, and that means regarding the truth of any natural

phenomenon.

Any judgment pertaining with the objects of nature which does not conform to the mathematical principles, that is, to the objectivity of the objects delineated in the mathematical principles, is subjective, mere opinion, it is not objectively valid, it is not even, in Kant's philosophy, a possible statement of knowledge, let alone necessarily truthful. The state of being in which the human being always dwells, all the beings before a mathematical objectification happens, become devoid of the possibility to hold any truth, but in an analysis that is calculative.

The sphere of the being in which the human being constantly dwells and must dwell in, as far as it is, is excluded from objective knowledge, from the truth, that is, by a thinking that is essentially calculative in order to be objectively valid. True representation, the true knowledge of beings is conceived to happen only within a calculative reckoning of all beings, grounded in their mathematical appearances, extension and intensity, categories of thought that let the objects comes to an intelligible stand in and by human cognition.

If Descartes grounds knowledge in human representing, he considers the senses unreliable. Kant brings sense-perception to fundamental prominence, again, yet, at the same time, he then straps it to a specific categorical understanding, calculative representing. Heidegger writes that

What stand as object in the world becomes *standing* in representational production...But what is present is present in a representation that has the character of calculation. Such representation knows nothing immediately perceptual. What can be immediately seen when we look at things, the image they offer to immediately sensible intuition, falls away (WT, 124).

The I-consciousness of the subject can possibly assert true judgments regarding

natural phenomena only through the perceptions which fall within the general rules of objective judgments, the principles. Those that do not are considered subjective, in that they are not subsumed under the ruling of the categories of the mathematical principles belonging to the subjective proper; the mathematical representing that is inter-subjective, valid everywhere, for everyone.

The principles of the transcendental philosophy are not just concocted by Kant, the principle are those fundamental propositions stating the categories that allow objects to be objects at all, coming to be in this initial, basic, fundamental representing. The principles rule over the Being of beings, that is, they articulate, in demonstration, the objectivity of the objects, such as it is available to a possible human knowing, not contingently and arbitrarily, but valid anywhere and anytime, that is, inter-subjectively valid for all humans.

The Being of nature is fundamentally rendered intelligible in the cognitive faculties, composed of perception and understanding, both mathematized in advance of any sensible encounter, and thus corresponding in anticipation to the mathematization of nature itself. Since now, not only is the book of nature made up in the language of geometry and mathematics, but the very sensible appearing of the objects of nature is mathematical, the approach to study nature with law-like mathematical formulations is justified, and even necessary.

Now since the mathematical formulations of the laws are projected in advance of all the factual instances of a phenomenon, and even beyond its straightforward perception, they have to be demonstrated in the experiment, proving the correspondence of the predictions of the law with the results measured by reproducing the phenomenon

under study in an isolated experimental set up, so as to isolate the causal relations, in controlling all possible interferences, and in this clarity of control, obtain measured results, reproducible by others in measuring devices, in machine technology.

Heidegger considers that modern technology is not just the practical application of modern theoretical science to useful objectives, in the mere use of better machines than in the past, that is, as a more serious, that is, scientific development of all the crafts, even if it can be understood in this way.

For Heidegger, in the context of the history of Being, the essence of modern technology relates to the understanding of Being of modern times, to the mathematical projection of nature, to the modern sense of truth as objective, as mathematically verifiable. That is, the workings of nature are modeled in the mathematical formulation of the law predicting regular causal relations which need then to be verified in the calculable results of the experiment. The ontological calculability of nature requires technology to produce any factual truth.

In this sense, technology becomes the way beings reveal themselves to us in terms of what is real, in the productivity of the experiment that measures up nature responses in the controlled environment of the experimental set up, in which nature is subjected to respond to the specific questionings that are asked by the theory. Modern technology, for Heidegger, is not any more the use of tools, like the use of nature in the windmill, now technology becomes the way to fundamentally bring natural phenomena as objects to human knowledge, manifesting them as predicable and controllable, that is, scientifically known.

For instance, modern physics projects nature as a coherence of forces that can be

calculated in advance, so it necessitates instruments to verify the correctness of the answers to its hypothesis that nature provides in the experimental apparatus, and thus a technological approach to nature becomes *the way* nature shows up as nature.

Heidegger considers that mathematical thinking essentially releases human knowledge in technology. Beings as objects come to be truly known in the representing that calculates the dynamical regularities of natural phenomena in technology, and can thus control the reproduction of such phenomena in the measuring device, whose refinement eventually allows the forces of nature to be put to work for human productivity and consumption.

Technology is no mere apparatus or mere practical application of theory, technology is how beings reveal to us in the mathematical projection of nature, in the modern sense of being brought to discovery as known in the critical experiment. Technology becomes the pathway through which, the objects of nature come to a stand as true, that is, in adhering to the calculative prediction of the law, in the verification of the experimental set up: in machine technology, and that is to say, in the mathematical projection of nature. Which now, with Kant, becomes the condition for the possibility of the knowledge of nature.

In this regard, Heidegger writes that

Experiments begin with the laying down of a law as a basis. To set up an experiment means to represent or conceive [*vorstellen*] the conditions under which a specific series of motions can be susceptible of being followed in its necessary progression, i.e., of being controlled in advance by calculation. But the establishing of a law is accomplished with reference to the ground plan of object-sphere. That ground plan furnishes a criterion and constrains the anticipatory representing of the conditions (QCT, 121).

That is, the theory, nestled already within the mathematical projection of nature (in the a priori and synthetic conditions for the possible knowledge of nature), can

propose law-like propositions under the conditions that presuppose how the phenomenon is understood ontologically, and thus appear as standing, as to what it is, and how it is, that is, in the delineation of how the natural phenomenon under study is already understood through a ground-plan sketching the nature of the phenomenon.

And if this ground-plan for all science objectifies the whole of nature as calculable is normative, is conditional for all science; in each of the positive sciences the objectification that happens in the theoretical models that represent the phenomena mathematically are always a limited representation of the phenomena themselves, that is, they are bound to be improved upon or revised.

In other words, the ontology of the phenomenon, the ground-plan at the base of each science is open to be revised. Indeed Heidegger considers that precisely in the work done on the ontology of the theory that science progresses, this is where the real progress of scientific work happens, instead of the more visible technological progress.

In other words, even if the sciences must have an understanding of the phenomena they study in order to approach them at all questioningly in experiments, this understanding does not have to be completely clear for the sciences to proceed and progress anyhow, that is, a science can model the behavior of a phenomenon without a complete understanding of what it is; so that the real movement of the sciences happens when the ontological understanding of their domain is worked upon, that is, work toward an improved definition of the nature of the entities under study.

Heidegger contends that regardless of the usefulness of technological advancements, the ontological considerations of the phenomena are what constitutes the core of all scientific work and progress, in the general sense of knowledge. That is, even

though a science already has answered the question of what it studies, which indeed guide its research, that is, its specific questions, yet it is the ontology of the phenomenon that remains still the fundamental questioning, as in the case of gravity.

In other words, the laws of motion can calculate the causal relations of the objects' motions in gravitational field, but have no answer when the question arises as to what gravity is. That is, what the phenomenon of gravity *is*, which is where modern physics starts.

In this regard, Buckminster Fuller writes that

If you were a contemporary of Kepler or Newton and were to have asked them what the mass interaction called 'gravity' *is*, they would have told you that they had no way of knowing. And there is as yet no way to explain the interrelationship behaviours found experimentally to exist 'between' and not 'of' any two objects in Universe. The relationships they discovered are elegantly reliable, but they also an absolute a priori mystery (Buckminster Fuller 1979, 171).

In other words, the relations of any motions of an object to the earth, for instance the relations of earth and a flying object, a rocket, can be calculated, opening the field to space travel, while still what gravity is, remains an open question.

And here Heidegger contends a key point, that with the successes of the sciences the connection between the mathematical experimental representing and the actual phenomena, that is to say, their ontology tends to loosen, thus the possibility arises that ontological thought is left unattended, and all there is are the hypothesis within a mathematical projection of the phenomenon under study, and the technological advancements in the verifications of such mathematical models.

In this regard Heidegger writes that

if...we undertake the effort to think through the inner state of today's natural sciences, non-biological as well as biological, if we think through the relation of mechanics and technology to our existence (*Dasein*), then it becomes clear that knowledge and

questioning have reached limits which demonstrate that, in fact, an original reference to things is missing, that it is only simulated by the progress of discoveries and technical successes. We feel that what zoology and botany investigate concerning animals and plants and how they investigate may be correct. But are they still animals and plants? Are they not machines duly prepared beforehand of which one afterward even admits that they are 'clever than we'? (WT, 41).

For instance, after modern physics has reached all the way to the discovery and successful experimentation with quantum objects, so that it can build all the technologies which are built upon it; the pressing and essential questions remain the ontological correspondence of the mathematical formulation with the nature of the phenomenon itself.

In other words, if classical physics up to modern particle physics used visual models to describe the phenomenon whose behaviour the mathematical formula aimed to predict, with the advent of quantum physics, this descriptive capacity of the theory breaks down, in that if the mathematical representation, the wavefunction, can indeed predict quantum events successfully, what the quantum events *are* remains obscure. They appear to come to a state of being ether as a wave or a particle in view of instrumental observing, yet before that they are a possibility, nothing definable with certainty (Resenblum, Kuttner 2006, 104).

Now, for the theory of the quantum objects, these do not exist but in their being observed in the recording of the instruments, even though they obviously must exist before that, as they are the building blocks of all matter. These questions regarding the ontology of the building blocks of physical objects, that is, regarding the physicality of all things, are obviously ontological, and at first look intractable, so they are usually avoided in favor of experiments that corroborate what is already known in more precise, sophisticated and better ways. What Kuhn calls normal science.

Heidgger contends that, at the core of science, there are always ontological questions that have been answered in a certain direction, but these answers do not represent the phenomena absolutely. So that the success of a science is not primarily in its

practical, useful results, but in its work on these ontological premises.

For Bell, for instance, science should aim to always go beyond what he called FAPP "for all practical purposes", that is, "accepting a merely FAPP solution for the enigma" (Rosenblum, Kutter 2006, 140). The enigmatic here are questions that arise regarding the relations of quantum objects with each other and with the instruments of the scientist, the subject, that is, regarding the correspondance of what quantum objects are and their mathematical formulation. In other words, now the instrumental observing of quantum objects, the measuring instruments "not only *disturb* what is to be measured, they *produce* it" (Resenblum, Kuttner 2006, 103). What comes to a questioning relief, here, is the very correspondance of mathematical formalism with the phenomenon itself.

Heidegger considers that even if modern science and technology are indeed very successful in their practical results; what counts, beyond all the practical technological successes of the sciences, is always, how far a science presses toward the ontological questions at its core, that is, the objectivity of its objects.

This is to be emphasized because the mathematical approach predominantly focuses research mostly toward hypothesis that can be conceived within the established ontological posits and which allow the possible verification of their prediction to be calculated; but then forgo to give, at the same time, also consistent thought regarding the ontology of the phenomenon, the philosophical moment at the base of each science's beginning and also pertaining to their true advancement.

In other words, Heidegger contends that each science develops, as they have to, within an ontological understanding of the phenomena they study, which includes both what and how the phenomenon is, and how this knowledge is available to the human

subject. Yet the more recent scientific proceeding has been steadily moving toward practical results, that is, the results of experiments that usually allow some form of prediction and thus of control of the phenomena in question. But this focus on results (within an established ontology) reaches a point where the ontological questions are not engaged anymore and tend to fade away, in the avoidance of a constant return to the phenomena themselves, i.e., their ontological questioning.

Then the danger arises of constantly theorizing regarding any phenomenon based only on their possibility to be put to test calculatively, within an already operative, unquestioned, ontological approach to the phenomenon, that is, with little or no consideration to the ontology of the theory, that is, of the philosophical implications of the theory.

And in a broader context, Heidegger contends that, this focus of constant research within a set ontological approach, in which the phenomenon can be somewhat controlled in a technology, gives rise to a sense in which the scientist is deemed as the master of the phenomenon, regardless of all the questions that still veil a more profound understanding of the phenomenon.

This, in conjunction with the position of preeminence that human representing acquires in modern metaphysics, brings about a situation in which modern metaphysics and science permit the human to conceive itself as the master of all beings, even though there is a slow letting go of the ontological questions that are at the base of science in general, and at the core of each and every science. Indeed, in every discipline of science, much is still questionable, and thus unknown, an unknown over which one lacks any insight much less mastery, and which can be known only by engaging and confronting it.

Heidegger considers that in the absolute predominance of modern metaphysics, as the mathematical projection of nature, ontological thought completely resolves in calculative thought, so that even if the ontology of a phenomenon, what the phenomenon is, is not completely understood and is made clear only provisionally, enough so its happening can be predicted in calculation and thus controlled in technology, then this knowledge is enough and even becomes primary, while the question regarding the ontology of the phenomenon eventually become underemphasized, or worst avoided.

And since the mathematical projection of nature is ultimately grounded in human representing, and since the mathematical approach necessitate instruments and these instruments are understood as human constructs, then the human acquires a position of dominion over nature, for instance, over a nature understood as a predictable thus controllable coherence of mechanical forces.

To recapitulate, in the context of the history of Being, Heidegger considers that both modern metaphysics and modern science's calculative approach devolves mostly in technological development, right because of the mathematical projection of nature; which also fosters the entrenching of the human being to a position of dominance over natural forces, in an extreme position of an attack on nature, which leads to the plethora of current problems, from the danger of atomic energy, to the devastation of modern agribusiness on traditional agriculture and nature at large. The human being considers itself the master over all beings, in theoretical thought and technological prowess, yet fundamental questions regarding science itself, and in each of the sciences are usually left unattended.

Heidegger considers that this position of the modern dominating attack on nature

consists in the subtle but consistent letting go of ontological thought, of the philosophical thought that is present, and must be present, at the base of each science, regardless if engaged by a scientist or a philosopher; and the concurrent predominance of calculative thought, that is, of a theoretical thinking that is always projected toward the calculation of results, of results in modern technology.

Again, For Heidegger, modern technology is not just the use of machinery in the application of scientific theory; it is a way of revealing the Being of beings. Technology is, for Heidegger, the consummation of modern metaphysics, it is the ultimate configuration of modern metaphysics by which the mathematical thought of the eminent subject defines the Being of beings. That is, the mathematical objectification of the Being of beings by the rationality belonging to the human being. Who, now, fundamentally thinks of nature in terms of laws that can calculate and predict and thus control nature, even though what nature is, in all its aspects, is still open to be questioned.

In this sense, then, Heidegger contends that, even if modern technology follows modern science, chronologically; the mathematical projection of nature leads modern science to its fulfillment in technology. That is, modern science, as the mathematical projection of nature, is preparatory for the advent of modern machine technology.

In the subject-object relation, Being as nature is absolutely objectified in view of the subjectivity of the subject, that is, of calculative thinking. Now, the theoretical thinking of the sciences becomes the proper thinking that thinks that which is, the Being of beings, as that which is calculable, as that which can be brought by the law to the calculation of prediction, and thus of control, in the experimental set up, in the apparatus, making manifest, in whatever ways pertinent, a response to questions opened by the

theorizing that is calculative.

The mathematical leaping ahead of all the facts in the theory necessitates machine technology to verify the facts in measuring apparatus, as is well exemplified in the eminent science of all the sciences, in physics. Since now the Being of beings is bound to calculative thinking and its intrinsic companion modern technology, that is, the mathematical projection of nature, all is rendered intelligible manifest only through these.

For Heidegger machine technology is the consummation of all metaphysics, and is intrinsic to modern metaphysics as the mathematical projection of nature, that is, Being as the objectivity of mathematical representing grounded in the cognitive faculties of the subject.

In modern metaphysics Being becomes representedness, Being becomes beingness. Thought, as human representing, as reason, as mathematical representing becomes the ground for Being. That is, the understanding of Being as mathematical representing projects how Being ought to be, it defines and circumscribes the perimeter of that which is real, mathematically ascertained, that is, technologically corroborated.

Furthermore, Heidegger interprets that all metaphysics prepares the advent of the age of modern technology. This preparation starts in Classical Greece; its initiation is found in the works of Plato and Aristotle, but especially the first.

When Plato interprets the Being of beings as *eidos* and elevates the Form, the model, that which can be recognized in all houses, as that which truly is, and that which instances, beings, individual houses, as conditional upon the *eidos*, the idea, the model, it conditions the Being of beings to a suprasensible order. At the very top of which stand the “good”, the “*agathon*”, which being unconditioned and conditioning all beings in Being,

it is how Being itself ought to be. Thus the late Greek thinking, finds its consummation in modern science and machine technology.

Heidegger thinks that the advent of the modern technological world is the last metaphysical stance of the Western understanding of Being, in the consummation of the philosophy of Plato. Plato places the highest of the ideas, the *agathon*, the good, as that which truly is, and as such that which conditions Being. Being itself is placed under conditions, it is not what rules anymore, as in the older sense of *phusis*. The *agathon* becomes conditional for the Being of beings, becomes that which makes for the possibility of beings, for their Being, their presence, their existence. The modern extreme configuration of this is that only that which can be brought to the calculation of mathematical models, and thus to control, is real.

This can be exemplified by Einstein, who in his 1933 Herbert Spencer lecture, writes

I am convinced that purely mathematical construction enables us to find those concepts and those lawlike connections between them that provide the key to the understanding of natural phenomena. Useful mathematical concepts may well be suggested by experience, but in no way can they be derived from it. Experience naturally remains the sole criterion of the usefulness of a mathematical construction for physics. But the actual creative principle lies in mathematics. Thus, in a certain sense, I take it to be true that pure thought can grasp the real, as the ancients had dreamed (Einstein 1933, p. 183; my translation)” (Einstein in Howard 2010).

This is how Heidegger traces the itinerary leading to the consummation of Western metaphysics. In Descartes the conditional for the Being of beings is the idea, Heidegger writes, “becomes the *perceptum* of a *perceptio*; becomes what the representing of man brings before itself, precisely as what makes the to-be-represented possible in its representedness” (N IV, 174). This is different from the sense of idea of the archaic Greeks as that which beings present of themselves to a human looking and probing, that

is, Heidegger considers that with Descartes

Now the essence of *idea* changes from visibility and presence to representedness for and through the one who is representing. Representedness as beingness makes what is represented possible as the being. Representedness (Being) becomes the condition of the possibility of what is represented and presented-to and thus comes to stand; that is, the condition of the possibility of the object. Being-Idea becomes a condition over which the one representing, the subject, has disposal and must have disposal if objects are going to be able to stand over against him. Being is conceived as a system of necessary conditions with which the subject, precisely with regard to the being of the objective, must reckon in advance on the basis of his relations with beings. *Conditions* with which one must necessarily *reckon*-how could one not eventually call them 'values,' 'the' values, and account for them *as* values? / The essential origin of valuative thought in the original essence of metaphysics, and the interpretation of Being as *idea*, and *idea* as *agathon*, has now been clarified (N IV, 174).

In other words, the ideas, the categories, the basic concepts become, in modern metaphysics, grounded in the subjectivity of the subject, and precisely as the conditions for the possibility of the Being of beings, as the purely mathematical model that can grasp the real, right because the mathematical is now grounded in experience, in perception (Kant). As will be articulated below, Nietzsche calls the basic concepts, the categories, “values” in the service to will to power. Everything in the world is now evaluated according to the values posited by the human subject, for its own growth and expansion, its will to power, its striving to secure dominion over the forces of nature. Value here is the current word for those basic concepts, the categories, the ideas, that guide knowledge in the proper and highest sense, they are not the values of subjective ethical behavior versus the concepts of objective knowledge.

For Heidegger, the basic formulation of all philosophy that names Being and thought, *phusis* and *logos*, in the verse of Parmenides, moves in that thought becomes foundational for Being, thought becomes the “ought”. Representational thought, specifically as mathematical, as calculative thinking, prescribes how Being “ought to” be.

Now the truth is no more the revealing of Being, now the truth reveals in the mathematical propositions stated by the eminent subject, by the “theoretical genius” (Kuhn 1977, 194).

The verse of Parmenides, *Phusis* and *Logos* are the same, Being and thought are the same, does not mean anymore that “the apprehending of whatever is belongs to Being because it is demanded and determined by Being” (QRT, 130) as in the original sense that Heidegger reads in Parmenides' verse; now thought underlies Being, it posits Being. Now the human being can become a genius.

The mathematical theoretical thinking, that is, calculative thinking, that is, machine technology takes over as that approach to the question of Being in which calculative thought properly stands as condition for Being. Heidegger articulates this position takes its final metaphysical, that is, onto-theological form, with Nietzsche' philosophy in which valuative thinking becomes conditional for the Being of beings, in the extreme sense of will to power, as articulated below.

CHAPTER 5

The Philosophy of Nietzsche as the Last Metaphysical Stance of the West: the Onto-Theology of Will to Will.

5.1 The Predominance of Calculative and Valuative Thought and the End of Metaphysics

For Heidegger, the mathematization of nature does not only entail the coming to predominance of quantification and calculation, but, concomitantly an interpretation of Being, in which the Being of beings, what nature is, loses its own standing, its own power, as it had for the Greeks, and even for Scholasticism, that is, as being created.

Obviously modern humanity acknowledges that it did not make nature, but in the context of the history of Being, modernity is the establishing that all nature is grounded in the human capacity to know, in being represented by a subject.

It is the subject that provides, as ground, the definition of the objectivity of the objects, in other words, the objectivity of objects is grounded in the subjectivity of the subject, and this relation cannot be left unattended when considering what nature is and what is the science that can know this nature, otherwise, in such non attendance, the cult of facts, positivism, arises.

As Kant realized, the application of mathematics to natural phenomena is not obvious, it had to be demonstrated. Modern science does not initiate from an absolute observing, but from a specific conceptual observing, for instance, that of Galileo and Newton, in which there are no more inner powers to nature, but forces representable in mathematical formulas, predictable in their behaviors, and thus eventually controllable.

Nature becomes a mechanism of forces represented in advance by mathematical formalism which, at the same time, calls for the criticality of experimenting, in experimental measuring apparatus, in technology.

So when science contends that the facts of science are objective, they are objective in that they are realized within the mathematization of nature, an overall projection of nature, of the objectivity of objects, based on the subjectivity of the subject, as the transcendental philosophy of Kant aims to clarify and articulate. Heidegger considers that, although this mathematization is a successful one, that is, one to which nature responds positively, it is, at the same time, one possible interpretation of the Being of beings, one possible approach to the question of the Being of beings.

In the context of the history of Being, then Heidegger contends that with the advancing and maturing of modern science, the human being becomes engrossed and swept by its own capacity to manipulate, albeit always in a limited way, the forces of nature in technology, propped by a metaphysics grounded in the productive reason of the subject. The subject, the human beings, thus takes the stand as the master of nature, regardless of the fact that truly, the complete knowledge of any such phenomena is still wanting, as any scientist who tries to shed new light on an unsolved problem knows.

In other words, the ontologies of specific natural phenomena are still open to be questioned; still some phenomena are ontologically unclear, like what gravity *is*, or what quantum objects *are*, and what our very relation with them is.

Overall, in modern metaphysics, no higher source stands above the intellectual perceiving capacities of the human. Now only that which is representable by the human subject *is*, that is, can become an object for possible scientific truths in mathematical

models and experimental verification. The Being of beings, that is, the nature of reality can only be accomplished within the overall mathematical projection by which nature as nature “presents itself for representation as a spatiotemporal coherence of motion calculable in some way or other” (QRT, 169).

Now nature becomes calculable and thus predictable in the laws that the human being can represent in its imagination, in the representing that combines conception and perception, a representing that proceeds experimentally right because the overall approach to nature is mathematical, calculative. The mathematical projection of nature, that is, the transcendental philosophy, contains and articulates the principles, the basic concepts which determine, in advance, the objectivity of all objects, the Being of all being, properly grounded, that is, justified in the subjectivity of the subject, the human faculties of cognition.

For Heidegger, in the history of Being, the last incarnation of such a metaphysical stand, of the mathematical projection of nature grounded in subjectivity, that is, that the Being of beings is only in view of the human representing that calculates out of basic principles, of basic concepts, takes its most extreme formulation in what Heidegger calls valuative thought; wherein now the Being of beings manifests and is only in the values posited by the human being.

The word value, in this context, is the overall rubric for those basic concepts by which everything is understood and allocated to its nature, its Being, precisely by human values, by basic concepts. By the categories which now, completely entrenched in the calculative thought of the subject, become values, a name that well encapsulates the predominately economic bent that calculative thought assumes.

Heidegger contends that Friedrich Nietzsche (1844 - 1900) is the philosopher that brings to articulation the last, that is, the current onto-theological stance of modern Western culture, which he also calls valuatative thinking. For Heidegger, valuatative thought is a more encompassing term for the calculative thinking that comes to prevail as the mathematical approach to the understanding of Being of modernity.

Modern metaphysics begins with Descartes when Being is understood as being represented, representedness. All beings become extended objects in the mathematical representing of the subject proper, the thinking human. This fundamental approach is sustained by the benevolence of God, who could not let the reasoning power of the human be mistaken. Sensible perceiving can be mistaken, the well-known Descartes's argument goes, but not the thinking capacity of the human, based on the sureness of its capacity to reason out, to think over from the most simple and certain, to the most complex knowledge of natural phenomena. Thus knowledge proper moves from the revelatory scriptures of the word of God as interpreted by his Church, to the consciousness of what the human has already in itself, reason, itself still related to the highest ground: the reason out of which God creates.

Within the same position of Descartes, Kant brings to fundamental relevance perception. Knowledge is no more based in pure reason alone grounded in the benevolence of a creator god; knowledge becomes human knowledge grounded in conception and perception. If the divine makes beings in its direct creative perceiving, human beings' perception necessitate thought to know, in the most general sense. Now knowledge, as human knowledge, is not essentially related to any higher ground, but on itself, in the two branches of the human capacity of cognition, in perception and thought,

that is to say, in the faculties of cognition, in the mind, in the brain.

Nietzsche examines that in Kant's philosophy God loses its centrality when the question pertains to the grounding of knowledge as knowledge, but Kant could not bring himself to explicitly assert that the human being does not need any more an authority to ground its own capacity to know. He could not let go of the fact that no more a god is necessary. Famously Nietzsche writes "God is dead" expressing what, he thought, Kant had reached but not explicitly asserted.

In Heidegger's interpretation "God is dead" not only means the losing traction of Catholicism in Western culture, in the concomitant rise of modern science; it also means, more broadly, that any otherworldly and suprawordly cannot in any way be brought to bear on the ultimate facts of life anymore. Indeed Nietzsche wants to do away with all metaphysics, which he traces back to Plato and his retrieval by Catholicism.

Heidegger interprets that the full scope of Nietzsche's phrase "God is dead" means the losing vitality and relevance of the understanding of all that which is, Being, conceived from that which lies beyond and above the wordly, be it the divine, the otherworldly, the supra-sensible, the meta-physical and as such most authoritative, as that which is most supremely Being. That which is, Being is no more to be drawn from any authority which gives measure and direction to all events and things in view of that realm beyond the appearing of the world, which give rise to all appearing and sustains it.

But in this overcoming of the beyond and the return to the physicality of Being, physicality is not just the merely material, but itself conceived as will to power and value positing. Being, which now for Nietzsche means the living and thus he uses the word Life for it, is the constant striving of temporary life forms toward expansion and growth. Now

Being, that is Life, means not merely the body, but the physicality of the body as will to power. Bodies exist in their willing toward enhancement of themselves, to grow and be more.

Knowledge, in this sense, does not only pertain with the faculties of cognition, but it is the will to expand, it is a desire, a passion of strength. And in this sense, for Heidegger, this a coarsening of Kant's and Descartes' positions; yet, at the same time, a strengthening of their very same position. Now for Nietzsche to believe in the soul and its fate belongs to a previous age, a childish age, now in the overcoming of all metaphysics of the modern age only the body is, in the value positing of will to power.

Now the conditions for all knowledge and activities come to reside in the striving to enhancement of life forms through value positing. Yet Heidegger considers that Nietzsche himself by setting conditions over Being still resides within the metaphysical tradition of the subjectivity of the subject. That is, he places thought over Being. The ideas, the categories, basic concepts now becomes values grounded solely in the drive of the body to power. And in such a way that this position becomes so unquestionable, that the question of Being becomes a vapor of a previous era, and will to power takes its place the more firmly, the more the obliviousness to any such questions becomes established. That is, the metaphysics of subjectivity becomes evaluative thought and thus establishes itself in the unquestioned obviousness of will to power in value positing. The metaphysics of subjectivity rises to its apex and yet there it disappears.

Heidegger writes, interpreting Nietzsche, that now the realm that constitutes the suprasensory, which as such, *is* in itself no longer stands over man as the authoritative light. The whole field of vision has been wiped away. The whole of that which is as such, the sea, has been drunk up by man. For man has risen up into I-ness of the *ego cogito*. That which is, as the objective, is swallowed up into the

immanency of subjectivity. The horizon no longer emits light of itself. It is now nothing but the point of view posited in the value-positing of the will to power...The uprising of man into subjectivity transforms that which is into object. But that which is objective is that which is brought to a stand through representing. The doing away with that which is in itself, i.e., the killing of God, is accomplished in the making secure of the constant reserve by means of which man makes secure for himself material, bodily, psychic resources, and this for the sake of its own security, which wills dominion over whatever is-as the potentially objective-in order to correspond to the Being of whatever is, to the will to power (QRT, 106-107).

Yet, in the killing of God, man does not become God. In the emptiness of God's position, the subjectivity of the subject is that which stands under, mathematical representing, that which underlies all beings, in that a being comes to be in being represented, only in the encircling of human representing. But this representing has no more illusions of articulating the order that guides and rules all things.

For Nietzsche that which is, is the becoming of chaotic forces which value positing temporarily fixes in Being; so that the truth itself is not a correspondance between mathematical formalism and natural phenomena anymore, but a temporary fixing of becoming, of chaos, in Being, in the truths of science. Truth is an error, an illusion, but an error, an illusion that is necessary (N IV, 132).

In other words, knowledge as science temporarily fixes its understanding of natural phenomena allowing itself the relative security of ascertaining causal relations, that is, the effects obtained given certain conditions by which it can control such phenomena without ultimately know what they are, because perhaps there is nothing there to be found, but the unfolding of chaos that the human is able to temporarily order in its understanding, thus controlling and managing those forces for its own use.

Thus knowledge is the constant striving toward not an absolute knowledge but to subjugate the chaos of becoming, overriding the forces of nature to will to power. All there really is, then, is the will to power explicated in value-positing.

In other words, notwithstanding the successes of modern science in technological advances, ontological questions regarding all natural phenomena still remain open. Heidegger contends that modern science, remaining within the boundaries and guidelines of the mathematical projection, arrives at uncomplete theoretical understanding of what the phenomena under study are, by which it can still predict and experimentally produce the conditions for specific effects to occur. In this way, it can then control natural phenomena into use and work. Yet, if research within this theoretical understanding provides enough positive results and technological advances, the ontological interpretation of the theory can be waived, that is, an interpretation of the phenomenon can be articulated in a theory knowing that it does not encompass the phenomenon completely, even to the point where these ontological questions remain completely unquestioned.

Now, even if knowledge proper still essentially relates to the ontology of natural phenomena, for Nietzsche the question of what nature is, beyond its use and control afforded by mathematical representation and experimenting, is not even a question. Now, after the decadence of all metaphysics, that the truth is up there, above all things and can be reached; the real answer has arrived in the constant value positing of will to power to dominion over nature. This is the very motion of Life itself.

Now in the vertigo that the progress of technology brings about, ontological questioning becomes somewhat suspicious, even though it is unavoidable for any science, since that is how any science can properly proceed at all and progress. Yet even more fundamentally, the ontological questioning of the mathematical projection of nature itself, what science is and correspondingly what nature is, is completely vanquished in the

maturing and establishing of modern technology; all that remains emphatically there are the effects of technology, as the dominion over the forces of nature.

The objects of nature become resources at the disposal of the subject, that is, of will to power. That is, modern science, in its technological prowness, becomes engrossed with its own capacity to dominate nature.

Heidegegr writes that "Nietzsche says: 'With its formulas, the natural sciences will teach how to *subdue* nature's powers. It will not put a 'truer' interpretation in place of the empirical-sensory one (as does metaphysics)" (ZS, 27). In other words, beyond the control afforded by the mathematical projection of nature, there is no truer interpretation of nature to be obtained anymore.

All that which is divine or supra-wordly is bound to faith or the beliefs of immature past ages and stands firmly outside the truth that is to be found in all the lines of research opened by modern science, the mathematical projection of nature, which now is just the constant striving of will to power toward power and control, and the truth as a mere stopover.

In the vacuum opened by the "murder of God", Nietzsche finds the striving, the willing of the human to truth, as the mathematical knowledge of science through which the forces of nature are brought, not merely to use, but to a control, that aims to subdue, to dominate nature's forces.

Now the capacity to know, knowledge in the most general and true sense, is not even a question and thus a matter for consideration for Nietzsche, as it was for Kant. Now knowlodge, for Nietszche, is grounded in the human being simply as a willing, as an animalistic striving toward its own enhancement in the control and exploitation of nature.

Now knowledge is really the willing of the human animal to master all that which is.

Now knowledge is grounded in the will to grow, to expand, to become more and thus to become master over the objects of nature.

In Heidegger's hermeneutic, Nietzsche's philosophy is the consummation of the modern metaphysics of subjectivity, as will to power. The Being of any being, that is, the beingness of beings, is in modern metaphysics, as beingness, dictated by representing, a position that places human cognition, however conceived, human representation at the ground of any knowledge, as Descartes asserts, and Kant aims to justify.

For Heidegger, Nietzsche's philosophy brings this position to a completion when human cognition expressly and essentially comes to be associated to an *appetitus*, an appetite, as a physiological striving inherent in knowing itself as Leibnitz also articulates (N IV, 65). With Nietzsche this is even furthered in that Nietzsche finds "our world of desires and passions' as the only definitive 'reality'". In this development, Heidegger writes

we discover clearly enough how decisively Nietzsche's metaphysics is developed as the fulfillment of Descartes' fundamental metaphysical position, excerpt that here everything is transferred from the real of representation and consciousness (*perceptio*) to the realm of *appetitus* or drives, and thought absolutely in terms of the physiology of the will to power (N IV, 134).

Will to power becomes the essential way of being of the *ego sum*, the I am. In other words, with Nietzsche comes to an extreme realization, what Descartes and Kant aimed to bring to articulation, the subjectivity of the subject that opens and grounds the objectivity of objects: the metaphysical stance of modernity.

The will to power explicates itself in value positing, that is, the positing of values, as Nietzsche puts it, is the viewpoint of conditions of "preservation and enhancement of

with regard to complex constructs of relative life-duration" (N IV, 61). To posit, to believe that such and such is so, is no more grounded in the justification of the benevolence of God (Descartes), or in the demonstration of the coming together of perception and thought (Kant), now to posit the highest categories is to posit values that condition the preservation/enhancement of temporary life-forms, that is, will to power.

The values are merely what any being that is living and thus is, has to constantly project because value positing is intrinsic to Life itself, that is, to will to power. The preservation and enhancement of life forms happens through value positing, which, now, is not related to a reaching for the truth, even a relative one, but to the constant positing of values, later superseded by new ones that benefit the growth of the one positing the values. As Heidegger writes, quoting Nietzsche, "Values, and their alteration, are related to the growth in power of the one positing the values" (N IV, 61).

Thus Nietzsche conceives truth as the will to truth, the physiological strive to expand, grow, and dominate of temporary life forms. Interpreting Descartes, Nietzsche then understands that the sense of the indubitable ground of truth, the *ego cogito*, the I think as conceived by Descartes is, as Heidegger quotes him, an "I will convince myself and be firm" or as an "I will not be deceived, or as an "I will not deceive"; in other words, the certitude of truth is a "will to truth" of the subject.

Heidegger writes that "Nietzsche refers the *ego cogito* back to an *ego volo* and interprets the *velle* as willing in the sense of will to power, which he thinks as the basic character of beings" (N IV, 129). *Ego cogito*, I represent needed a god to believe in itself, *Ego velle*, the I-ness understood as I will, needs to murder god, to free itself in the possibility to recognize its essence in will to power.

Nietzsche posits the ground of Being in the subjectivity of the subject, though not in the cognitive faculties grounding representedness, nor the consciousness of the human, but in the psychological explication of the being-understood as being alive, and aliveness as willing, as the desires and passions, the will intrinsic to life as life, the will toward growth of itself, in the enhancement of itself, in the constant expansion of its reach over the radius of its being, to muster in dominion over itself and over other beings, that is, will to power. Heidegger writes that “Nietzsche thinks the fundamental character of beings as a whole in the unique thought of the will to power” (N III, 18).

The basic, fundamental determination of beings as a whole reads “*Life is will to power*” (N III, 18). This the most fundamental characteristic of all beings, Heidegger writes that “In every region of beings: in nature, art, history, politics, in science and in knowledge in general. Insofar as these things are beings, they must all be will to power” (N III, 19). So that, Heidegger considers that knowledge too is for Nietzsche “will to power” that is the will to master, the will to dominate (N III, 194).

All that which is, beings, are now defined as everything that as alive, it strives toward, not only its preservation, but simultaneously, also, its enhancement; since to strive toward preservation only is already a sign of decadence of life, that is, of will to power. Heidegger writes, quoting Nietzsche, “Everything that lives is will to power. 'To have and to want to have more—in one word, *growth*—that is life itself’ (WM, 125)” (N III, 196).

Since for Nietzsche, life is will to power, then knowledge is really about the strive toward control and mastery over the forces of nature. Will to power explicates itself most vividly in the most ruthless of all animals, the human being. Knowledge is inherently will

to truth, the mastery over objects in exploitation. In the positing of ideas, of concepts, that is, of values, by which nature is temporarily understood and fixed and thus controlled and used in modern science and technology.

This is Being, that is for Nietzsche, Life, the striving to become more, the will to accrue and expand of temporary life forms. Now that God is dead, the Being of beings, Life, is the willing of life forms toward power, growth, and the expansion of dominion over its own boundaries and others. But this striving has no other aim than to overcome itself toward even more power, thus the eternal return of the same. That is, when the will has achieved its impulse to grow and expand, it strives only for more power, this willing power, wills toward more willing power.

In Heidegger's phenomenological hermeneutic of Western metaphysics, the last onto-theological stance of metaphysics is composed of will to power, and the eternal return of the same; that is to say, will to will. Heidegger retrieves that the onto-theological position of Nietzsche, which he considers our current one, is will to power and the eternal return of the same.

The motion of willing power always return to itself, that is, to will more power, from here the eternal return of the same, that is, willing power has no other aim that to will more power; thus Heidegger calls it will to will. Will to will is the essence of any being as a being and the way any being as such being exists as living. Will to power and the eternal return of the same are the last onto-theological stance of metaphysics, standing as the very consummation of metaphysics.

In this regard, Thomson writes that “Nietzsche understands 'the totalities of entities as such' *ontotheologically* as 'eternally recurring will-to-power' (or simply 'will-

to-will'), that is, as an unending disaggregation and reaggregation of forces without any purpose or goal beyond the self-perpetuating augmentation of these forces through their continual self-overcoming" (Thomson 2005, 55-56), that is, the overcoming of their previous positions of power. Beyond this "self-perpetuating augmentation of these forces" there is nothing, beyond will to will in its eternal return, there is nothing.

Heidegger contends then even if Nietzsche wanted to overcome the whole of Western metaphysics, he remains within the metaphysical tradition, entrenching it in the most extreme position of such a tradition: the onto-theological stance of will to will as conditional for Being. And thus even if Nietzsche thought to overcome Platonism and all metaphysics, he remains within it, by dictating the constant value positing for the preservation/enhancement of temporary life forms, will to will as conditional for Life, for Being.

For Heidegger then, with Nietzsche the age of modernity comes to completion in that, while metaphysics is finally thought as overcome, it comes, instead, to the most extreme position of will to will, insidiously disappearing as unquestionable in the irrelevancy with which metaphysics is usually now set aside. And by metaphysics what is meant here are the questions that Heidegger contents are the topic of ontology, of first philosophy, of transcendental philosophy: the question of Being and the approaches toward this fundamental questioning.

Thus for Heidegger, all metaphysics as the metaphysics of subjectivity, that is, the grounding of Being in the productivity of human cognition, comes to a completion by fulfilling itself in the technological world. All philosophy, as the metaphysics of subjectivity, thus prepares the coming about of the technological world, and in the

successful establishment of technology, itself disappears (TEP, 99).

Now ontological questioning still happens in each and every science, in the theories and researches of anthropology, of physics, of biology, of chemistry, of psychology, of neurology, etc.. In other words, in the age of completed metaphysics, for Heidegger, philosophy becomes anthropology and in this way “it becomes a prey to the derivatives of metaphysics, that is, physics in the broadest sense, which includes the physics of life and man, biology and psychology. Having become anthropology, philosophy itself perishes of metaphysics” (TEP, 99).

In other words, as said before, in the articulation of the mathematical projection of nature, metaphysics disappears precisely by grounding the proper study of nature, ontologically disclosed as forces mathematically reckonable in advance in modern physics. Knowledge proper is sought out in all the branches of science, among which physics is the most fundamental of them all.

It is this historical situation, Heidegger contends, that brings about the irrelevancy of metaphysics, of ontology, which loose permanency, validity, and incisiveness in the Western world, and all that remains is the ontological (ontic) thought of the sciences, which in their ontologies (ontic posits) are always bound to the mathematical approach, which they do not question

And thus Heidegger contends that ontology, as the approach to the question of Being, disappears, in its consummation as valuative thought in modern machine technology, and becomes inconsequential and vacuous in view of the concreteness of technology and of the facts of the sciences, that is, the experimental machinery of facts' checking.

In this sense, for Heidegger, metaphysics, as the historical approaches to the question of Being, articulated in the question regarding the Being of beings and Being as a whole, disappears, becomes completely unquestioned, that is, unthought, precisely as the consummation of the metaphysics of subjectivity, when Being is approached from a productive comportment of the subject, now will to power.

And because it is unquestioned, that is, it is not recognized or even questioned as that understanding of Being that pervades Western humanity, or at least that attempts to articulate such understanding of Being, that is, that known, yet vague, sense of reality which guides all the attitudes of our age, that is, in Heidegger's terms, modern Dasein, modern being-in-the-world. Such an understanding of Being, without being recognized as such, dominates Western humanity absolutely.

Then, for Heidegger, the human being becomes the master of beings, and forgets that the human being is that beings that is an openness to an understanding of Being. So that modern humanity accepts an understanding of Being with little sense of its content and historical unfolding, forgetting its role as the shepherd of Being, as the one being who in its being gives meaning to Being, to the Being of beings.

Now, at the consummation of Western metaphysics, what is conditional for Being are not the basic categories of the pure understanding, even though at the level of any science basic concepts and principles still play their part. Now conditional for Being is will to will, and nothing more. Even science is not the pursue of the pure knowledge of the truth, but itself is caught in the economic struggle to demonstrate success and gain, against any adversary, within the context of the established positions of power of concurrent and competing institutions and organizations, each invested in their own set of

values, of basic concepts.

Overall then, knowledge, as will to power, gets completely and unquestioningly entrenched in the predominant and somewhat always successful use of calculative thought in approaching all domains of objects, toward the discovery of prediction and thus of control, for the enhancement-preservation of some group, institution or organization, that is, for gain and profit.

Now then, in that the ground of knowledge, the *cogito*, the representing becomes willing, will to truth, how thinking itself is conceived to be also changes. Heidegger quotes Nietzsche who writes that "Thinking is for us a means not of 'knowing' but of describing an event, ordering it, making it available for our use" (N IV, 130). Heidegger interprets that here Nietzsche conceives thought, that is, knowing, the truth "only insofar as it serves the preservation of will to power" (N IV, 130).

Regardless if Nietzsche's metaphysics is reflective of our age or not, it is the attempt to think, to delineate the understanding of Being in the age in which the subjectivity of the subject, in its historical detachment from any authority, being it divine or a general sense of the mystery that still surrounds all that is known, comes to a position that can be described as the complete dominance over the earth. The use of everything, which indeed must happen, is carried with an overall sense of almost violent appropriation, in a sort of frenzied productivity that consumes all, in the overall claim of benefiting humanity at large, but also in the very real sense of the accrual of power by centers of power, unfolding in the struggle to project their self-interests posited in the values of their different worldviews.

5.2 The Object as Standing Reserve

Now that the ground for Being, that is, the subjectivity of the subject is understood as will to power in value positing, as will toward truth for preservation and enhancement, then, at the same time, also the objectivity of the object, comes to a different allocation.

Heidegger contends that now the objectivity of the object loses any standing for itself, a standing that is still implied in the German word that Kant uses, *gegen-stand*, now the object appears precisely and exclusively in the value positing of the will to power, and only there, nature becomes the forces of physical nature over which technological progress extends in ever extending discovery, mastery, and control and thus domination. In the constant utilization of such forces of nature, the will to power extends in ever more efficient ways of extraction/production, storage, distribution and deployment for the preservation/enhancement of the most ruthless animal, the human being.

The objects of nature lose any standing for themselves, they manifest, they are in the obviousness of being resources at the disposal of human beings, of will to power. Heidegger calls this transformed object, that which stands in reserve, the standing reserve that can be put to work at any one moment in the allocation of demand for ever escalating production.

Any object comes to be, to stand, in the fundamental sense of that which is in Being, in the Aristotelian sense of “that it is”, on the granting appropriation of the will to power, and only within this granting, so that the possibility arises, in full justification, that is, in the metaphysical necessity of this claim, to divert whole rivers, dam them, and

completely control their flow in view of energy production and flood control, that is to say, water dispensation. The mighty Colorado river can become, in essence, a super-sized, a gigantic, water spigot.

In view of valuative thinking, of that thinking that posits values and calculates their worth in terms of the gain and control, Heidegger contends the object stops being an object, something standing on its own against the representing subject. Now the object stands only in its readiness to be available on the demands of the willing that reckons and plans, and in this planning orders all there is into a schema, by which each being is allocated, not only its useful position, but its worth to the willing for power.

For Heidegger the objects now become not only “stock”, but more essentially, they become standing reserve, the reserve that stands ready to be deployed, in all type of industries, and before that, duly prepared by experimental research.

Heidegger writes that

Everywhere everything is ordered to stand by, to be immediately at hand, indeed to stand there just so that it may be on call for a further ordering. What ever is is ordered about in this way has its own standing. We call it the standing-reserve [*Bestand*]. The word expresses here something more, and something more essential, than mere 'stock.' The name 'standing-reserve' assumes the rank of an inclusive rubric. It designates nothing less than the way in which everything presences that is wrought upon by the challenging that reveals. Whatever stands by in the sense of standing-reserve no longer stands over against us as object (QCT, 17).

The challenging that reveals is Heidegger's interpretation of the maturity of modern science, precisely in modern technology, he writes that

The revealing that rules throughout modern technology has the character of a setting upon, in the sense of a challenging-forth. That challenging happens in that the energy concealed in nature is unlocked, what is unlocked is transformed, what is transformed is stored up, what is stored up is, in turn, distributed, and what is distributed is switched about ever anew. Unlocking, transforming, storing, distributing, and switching about are ways of revealing (QCT, 16).

Now all objects become standing reserve. All that which is is in its being allocated in the schema, that is, in view of the goals and purposes, of the values posited by centers of power. Beings are understood as resources, that is, they essentially show up as resources at the disposal of will to power, that is, allocated in their disposability by centers of power, willing preservation and enhancement of themselves just for the sake of the constant return of willing more power and growth. The subjectivity of the subject is understood, in the most extreme position, as the evaluating of calculative thinking in which all is measured up to values or laws, all that is not possible to be measured up is left to the vague indeterminateness of its unknowability, in its lack of certainty, which now means its numerical worth within the framework of productivity or knowledge, ultimately for gain and control.

In this extreme interpretation of the objectivity of the objects, Heidegger contends, all objects, any being, lose any standing for themselves, they are not even objects that stand versus our representing, they become standing reserve. All beings are ordered to the orders of centers of power, corporations, the states, organizations, powerful individuals. All nature then becomes mere resource standing there ready to be deployed toward the productivity that brings more power to the centers of power, that is, to will to will.

In this heightened sense of control that technology provides, the attitude of respect for the things as they themselves are, as that which arises out of itself, and in this standing gives of itself, in all that it offers to us, in our use of them, vanishes. Now the farmer becomes the “grower”, no more the cultivator that takes care of the land so that the forces of growth can take their proper course and bring forth the maturation of the

crops and the multiplication and health of the herd, now cultivation and husbandry become agribusiness.

In other words, now the subject's prowess to bring to production, in ever so efficient manners, all available resources is carried with an attitude in which nature, challenged forth in ever disclosing ways, is looked upon with an air of one who can, not only control it, but can also make it better.

Now living beings, being them molecular machines, can and must be engineered and modified into new beings, so that they can provide for our needs, in ever more efficient ways, at the same time, though, what most of DNA does, still remains an unknown. In this sense, then genetic engineering, the making of genetic modified organisms, must and is carried over and against beings themselves, since what living beings are, ultimately awaits a better understanding.

All that is, comes to be and is within the representing power of the willing subject, within its surveying capacity to calculate toward enhancing power and gain. This overall attitude of calculation, Heidegger also calls enframing which means “the gathering together of that setting-upon which sets upon man, i.e., challenges him forth, to reveal the real, in the mode of ordering, as standing-reserve” (QCT, 20).

Enframing is the extreme position of the priority of the subjectivity of the subject in the representational striving that reveals all nature in technology, bent on approaching all beings in the calculations for its own gain and enhancement, by projecting its will in value-positing over all that which is.

Every use of things in which we carry ourselves, in the lab as in the kitchen, in the factory floor or in the artist's studio, is pervaded by this sense of unacknowledged and

pervasive superiority over beings.

The subject of Medieval times, the sense that all beings are subjects in that they are created, that is, equal in being created, disappears becoming the object standing against, and only within, the representing of the eminent subject of modern times, who as will to power orders everything else as standing reserve.

All that which is, is by standing ready to be ordered and optimized in this ordering, in the uses in which humanity itself, ultimately fulfilling this position to its extreme, deploys even itself, via its own objectification, as the labor force, as human resources.

And indeed in the modern world, beings lose their standing, they become mere resource at human disposal. The cow becomes a live-stock, in view of some of the highest categories, the highest values: productivity, profitability, efficiency. Now the cow is not even a ruminant anymore, since it is fed a diet consisting, at best, of seeds, and at worst, of remnants of other cows. So that, today, the wrapped steak sold at the supermarket is marked "grass fed", when the cow has been finally allowed, before slaughter, *to be* the cow that it is, before any human calculation.

Now all that which is, does not even show up as object. It appears only when asked to show up on demand, that is, in its readiness to be on reserve, so that it can be on call to be used up, to be consumed, and then trashed away, that is, as something essentially disposable and as such always replaceable, in the astringency of the dominating economical values of ever more efficient extraction, production, and utilization happening in the self justified exploitation of natural resource, no more in the sense of the harnessing of the flow of the water by the water wheel, but the damming up

of a whole river, the engineering feat of the complete control of “drainage systems”. The river itself disappears ordered to deliver power and water on demand, and recreational opportunities for the tourists ordered about by the tourist industry.

5.3 The Surge to Predominance of Calculative Thought over Contemplative Thought

Heidegger's English translator, Rojcewicz, articulates this interpretation of the complete meaning that is meant in Heidegger's pointing to calculative thought, as the type of thought that comes to dominance in the Occident at the consummation of modern metaphysics in modern machine technology, in our current age.

Calculative thinking is not solely understood in the sense of measuring and computation, even though it includes these, it not only implies the set up of nature mathematically in technology, thus working out numerically in ever increasing precision, or probabilities, the facts regarding natural phenomena.

In the complete arising of the technological world, in which our epoch stands, calculative thinking now acquires the more comprehensive sense of planning and scheming: the evaluation of all that which is, or can be brought to be, within the reach of its vision, and that is evaluated as to its worth constantly in view of the self-interest and self-gain of the willing subject, of its values.

Rojcewicz writes that
Calculative thinking, according to Heidegger, is not necessarily computational. It does not require calculators or computers. It is not necessarily scientific or sophisticated. It should then be understood precisely in the sense in which we call a person 'calculating.' We do not mean such a person as gifted in mathematics. We mean he is designing; he

uses others-to further his own self-interest. A calculating person is not sincere. There is an ulterior motive, a selfish purpose, behind all his relations. He is engaged with others only for what he can get out of them (Rojcewicz 2006, 215).

Rojcewicz continues writing that

Calculative thinking is therefore not so much a way of thinking, understood as reasoning or deliberating, but is rather a general outlook on things. It is an attitude that beings are simply there for what we can get out of them, that the world is there for us to exploit. In other words, what Heidegger here calls calculative thinking is precisely the attitude of modern technology... Calculative thinking amounts to an *attack* on things and sees the world, as Heidegger now says, one gigantic filling station...Calculative thinking is the way of disclosive looking Heidegger had earlier called challenging. It sees all things as there to be ravished and motivates their actual ravishment (Rojcewicz 2006, 215).

Indeed today all beings are given their proper and real standing by calculative thinking, in the verification of how they respond to the questions that science, from basic concepts, out of its representing, its theories, asks of them in the experimental set up that measures and computes.

Furthermore now this representing measures up everything in view of its own value positing, unbound to nothing else but its will to power, it allocates all beings, natural and not, human and not, to be mere resources, the standing reserve allocated and deployed to the most efficient and profitable use by centers of power.

The prediction made possible in the laws of nature's behavior, is actualized and demonstrated in the experiment, by which scientists challenge nature to respond to the questions that the theory demands, thus in a sense, subjugating nature to respond in the setting of the experimental apparatus, by which nature can be brought to control.

The fact that successful experiments allow for some form of control over nature becomes so accentuated and predominant that the ontological questions and their answers, upon which any experiment can arise, stop being visible as those issues which are ultimately relevant in how any phenomenon is conceived, approached, and thus

experimented upon. In this way, the calculations of prediction take precedence in constant search of results, in an attitude that resembles an attack, by which the forces of nature are forced to respond so that they can be brought under control for use and gain.

In view of such an attitude then nature almost appears to be forced to respond to the questioning of the scientific theorizing, whose rigorousness is but the staying within its ontological projection, that is, the mathematization of the real, that is, a specific interpretation of the Being of beings.

Heidegger contends this interpretation of the real in the mathematical projection of nature, by which the subjectivity of the subject becomes foundational for the objectivity of the objects, reaches a position in which nature is understood solely as a coherence of forces, that is, a mechanism predictable in calculation and thus controllable in experiments, and in this way available to a fundamental appropriation of its Being.

All nature eventually becomes resources made ready for exploitation in the evaluation of their worth by value positing. All nature becomes standing reserve ready to be employed in machine technology, and beyond that, nothing else.

Modern technology Heidegger calls a “destiny” in the historical sense of the discernment of the preparation that previous epochs had on the coming to dominance of modern machine technology, of the scientific attitude, of the dominion of calculative thinking. Technology, for Heidegger, is not just the end result of the application of science to utilitarian purposes; it is the realm where truth happens, where beings manifest as to what they are: resources at our disposal in the projected values of human culture.

Technology is the setting up of phenomena within the parameters of axiomatic formulations regarding their essences, what they are, in mathematical models, which

manifests the phenomena in experimental apparatus, in the measuring instruments. These quantify the numerical calculations' cogency of experimental results with the prediction of the mathematical formulas, possible within the ontological description of such phenomena. And such ontology, the ideas, the concepts, with which the phenomena are approached, are achieved exclusively and obviously by the eminent subject.

The ancient wonder, experienced by the Greeks, to be able to know at all, and to be able to participate in the bringing forth of the Being of beings in *poiesis*, in poetry, in the vision of the essence of beings; the thankfulness and wonder for the fact that the Being of beings is available to us, that is, open to us, that the essence of beings is available to us, disappears. In the main, wonder happens for all things technological, ultimately a human producing, in which we can dispose of beings as we see fit, in ever more efficient ways.

The appearing, the presence of beings, that is, the Being of beings now comes to relate most closely to the productive representing of the human genius, made viable by the economical boundaries of the legal monetary framework, institutionalized as binding for the efficient management of all beings, ourselves included. Everything shows up as disposable resources valued in the dispositions commanded by competing centers of power. Everything, ourselves included, are resources, standing in reserve, ready to be efficiently put to work in the specific economical sense of utilization for profitability, for the gain and advantage of self-interests.

Heidegger writes that with the consummation of metaphysics

This setting-upon that challenges forth the energies of nature is an expediting...and in two ways. It expedites in that it unlocks and exposes. Yet the expediting is always itself directed from the beginning toward furthering something else, i.e., toward driving on to the maximum yield at the minimum expense. The coal that has been hauled out in some

mining district has not been supplied in order that it may simply be present somewhere or other. It is stockpiled; that is, it is on call, ready to deliver the sun's warmth that is stored in it. The sun's warmth is challenged forth for heat, which in turn is ordered to deliver steam whose pressure turns the wheels that keep a factory running (QCT, 15).

That all knowledge is a human producing stands before the full advent of the modern technological world, in which the technological prowess is not about harnessing the wind or the flow of water, or bringing the essence, the truth of beings to a manifestation and preservation in work of art, or building, as for the Greeks; but to extract, to order nature into giving energy, or minerals, or vegetable material, or animal proteins, and at the helm of such ordering, and also at its yoke, there stands the eminent subject, its genius, its capacity for expansion and dominion over all beings. Now the human becomes the master of beings, forgetting that the human is the shepherd of the meaning of Being.

Heidegger writes

What is the ground that enabled modern technology to discover and set free new energies in nature? / This is due to a revolution in leading concepts which has been going on for the past several centuries, and by which man is placed in a different world. This radical revolution in outlook has come about in modern philosophy. From this arises a completely new relation of man to the world and his place in it. The world now appears as an object open to the attacks of calculative thought, attacks that nothing is believed able any longer to resist. Nature becomes a gigantic gasoline station, an energy source for modern technology and industry. This relation of man to the world as such, in principle a technical one, developed in the seventeenth century first and only in Europe. It long remained unknown in other continents, and it was altogether alien to former ages and histories. / The power concealed in modern technology determines the relation of man to that which exists. It rules the whole earth. Indeed, already man is beginning to advance beyond the earth into outer space (DT, 50).

In the *Memorial Address*, Heidegger makes perhaps the most clear and concise articulation of his assessment of the modern, that is, technological world. Heidegger contends that what comes to fundamentally sustain modern culture is calculative thinking. By calculative thinking Heidegger means more than what Plank meant when he

wrote that only that which can be measured is real.

Calculative thinking is not solely understood in the sense of the computing that measures, that set up and thus works out numerically in ever increasing precision or as a probability, the predictions of causal relations in natural and social phenomena. The mathematical projection of all that is, now attains an extremely aggressive stance, by which the calculative nature of modern science and technology acquires the more comprehensive sense of planning and scheming, not just for mere use, but always in view of self-interest, gain, and exploitation. Calculation becomes the evaluation of all that which is, of Being, according to the value positing of the will to power. All is evaluated as to the values of its worth in the calculations of the self-interest of viewpoints willing power.

Yet calculative thinking is not something to be opposed and fought, on the contrary, it has, as Heidegger puts it, “its own great usefulness. Such thought remains indispensable. But-it also remains true that it is a thinking of a special kind” (DT, 46).

For Heidegger the peculiarity of this thinking

consists in the fact that whenever we plan research, and organize, we always reckon with conditions that are given. We take them into account with the calculated intention of their serving specific purposes. Thus we can count on specific results. This calculation is the mark of all thinking that plans and investigates. Such thinking remains calculation even if it neither works with numbers nor uses an adding machine or computer. Calculative thinking computes. It computes ever anew, ever more promising and at the same time more economical possibilities. Calculative thinking races from one prospect to the next. Calculative thinking never stops, never collects itself. Calculative thinking is not meditative thinking, not thinking which contemplates the meaning which reigns in everything that is (DT, 46).

In the *Memorial Address*, Heidegger considers that the metaphysics of modernity, of subjectivity and objectivity, which underlies the mathematical projection of nature, has indeed brought about many improvements for people in general, in all the technological

gadgets and instruments, which are now even indispensable to carry our lives in our affairs and businesses, but it has come about in the fostering of the predominance of an attitude toward everything that incessantly calculates, in the sense of planning and scheming for control and gain.

So that what Heidegger considers the most vexing issue of modern technological world, goes beyond all the problematic issues that technology brings, like the great annihilative power of atomic energy (DT, 51), or the possibility to “synthesize, split, and change living substance at will” (DT, 51), or the constant threat of environmental disaster, the most dangerous issue of them all is precisely that calculative thought becomes the predominant and exclusive way of thinking, that is, that it completely overshadows meditative thinking, which comes to be considered, as Heidegger puts it, “worthless for dealing with current business”, in that “it profits nothing in carrying out practical affair” (MA, 46). So that meditative thought, contemplation, thinking in the proper sense, the thinking that thinks the meanings in all that is, becomes unattended.

Heidegger contends that closer to the human being than calculative thinking stands meditative thinking, which, Rojcewicz argues, is better translated in English as contemplation. Rojcewicz writes, in this regard, that

The greatest danger as Heidegger stresses again in his speech on *Gelassenheit*, is not that technological things, such as atom bombs, might get out of hand and destroy human life. Something more tragic is imminent, namely that calculative thought...might depose contemplation. Calculation might commandeer the entire field of thinking, might be reputed the only valid mode of thinking (Rojcewicz 2006, 217).

This is for Heidegger the most profound danger of the technological age, which is not meant only as the age of machines, but of that understanding of Being that approaches beings exclusively from a thought aiming at producing and calculating

results, which even if is indispensable, it happens in the concomitant letting go of meditative thinking, of contemplation, the thought that contemplates the meaning, the essence of phenomena.

Contemplation is for Heidegger, that thinking that thinks the assumptions at the base of any knowledge, for instance the Kantian conditions at the base of any mathematical knowledge of nature, indeed the very conditions for the veracity of calculative thought; that thinks the meaning and implications of the use of measure and number, of shape and calculus, to properly discover and access what nature is, so that, for instance, it contemplates that the predominance of this very successful mathematical approach makes the nature closest to us, the nature available to our straightforward perception and observing, in a sense disappear, because, now, this realm is excluded from any claim of truth.

In other words, the predominance of such calculative approach closes off other interpretations of the Being of beings, other ways of being-in-the-world, and furthermore precisely by shunning away from contemplation, it runs away from what is closest to us. So that, Heidegger considers, in the very questioning regarding the essence of the human being what should take precedence “this method of the natural sciences which grasps and calculates laws of nature or the claim to determine the human being's being as such from the human being's self experience?” (ZS, 26).

Indeed calculative thought, the mathematical projection of nature, practically shuns the truth away from that state of Being, in which the human always already dwells, the one which one calls one's life. That is, for Heidegger the greatest danger is that by disposing of contemplation, and embracing calculative thought, humanity then enters in a

state that lets go of what is closest to it, its being-in-the-world, the “openness that we are”, that is, whether we are clear or not about it, that we are an understanding of Being.

And Heidegger contests that although this age does not consider itself lacking in thought, it is really a calculative thinking, one that rushes to theories and their possible experimental results, without taking the time to contemplate, without realizing the difficulty and thus the patience involved in contemplative thought, for instance, the difficulty to regard the meaning of technology. Where is technology leading us? To the land of eternal happiness, or to the doom, not only of the extinction of life, but worst, of the slavery to control everything and everybody without keeping on questioning what is it that we are controlling, regarding what nature is, what humanity is. Still so much is unknown, Heidegger contends, still so much is unknown about our world and about what really counts for each one of us, to let go of contemplation, and enter then in a state of thoughtlessness, that is, complete lack of ontological thought and yet, at the same time, driven by it unknowingly.

In this regard Rojcewicz writes, quoting Heidegger, “What great danger would then be impending? Then the highest and most fertile acumen in calculative planning and invention might be accomplished by indifference toward contemplation, total thoughtlessness in the genuine sense” (Rojcewicz 2006, 217). This thoughtlessness is the great danger right because, Heidegger stresses, the human being is a contemplative being at its core, just as the arising of modern science attests, for instance, in the metaphysical meditations of Descartes and of Kant.

In the *Memorial Address*, Heidegger in very straightforward and simple language indicates in contemplation the highest call of the human, from which the modern human

is recusing itself, recusing from the contemplation of the Being of beings, precisely in the complete taking over of calculative thought, which has its regard fixed on beings, given already in the mathematical projection, set in conditions aimed at producing theories regarding beings, for their eventual manipulation, management, and control.

Rojcewicz writes that for Heidegger

Contemplation is paying heed to Being...It is not concerned with solving everyday practical problems by manipulating beings in ingenious ways. Contemplation is sincere; it does not look upon beings in terms of our own interests but instead seeks the meaning, the essence, of beings. But contemplation must then also be practical, since our understanding of Being, of the essential possibilities of beings, determines what we can make of beings and determines our role in the activity of making. Indeed, for Heidegger, contemplation is of the utmost practical use, since it may bring forth genuinely 'lasting human works' (G, 26/57), in contrast to the disposables produced by calculation (Rojcewicz 2006, 217).

In other words, contemplation in that it is not restricted to already set conditions, in that it searches for new possibilities by which beings can be understood as to what they are, can appear unpractical and not concrete; yet it is the most practical, since it brings about the definitions, the assumptions, the ideas, the concepts, and the values by which beings, phenomena, situations, scientific problems fundamentally appear, that is, are rendered intelligible and are thus approached and practically dealt with.

Heidegger allocates to contemplative thinking a higher call for the human being to follow, indeed all metaphysics defines the essence of the human being as a thinking being. For Heidegger thought is not a physical property that belongs to the human as human, so it can compute, predict, and control; but thought belongs to the human being in such a way that the human being brings meanings out in the open. Whatever surrounds us and is, it exists before the human being exists, yet it comes to a meaningful presence in human comporting, that is, in the meanings coming into the open through human beings,

indeed the Being of beings manifests in intelligibility as our very life.

Heidegger contends that contemplation, as that thinking that considers the essence of things, does not have to necessarily be focused upon what Heidegger considers that which is most worthy of thinking, that is, the question of Being, but it can be directed to anything, to any scientific problem, to any situation that directly and closely concerns one.

Letting go of calculative thinking, which right away focuses on results within set conditions, Heidegger incites us to think in view of the being of any problem or situation, to think the essence, the nature of that which concerns us, because even though this might appear the most detached and unpractical type of thinking, in that it aims to define the being of a problem, the nature of a problem, of a situation, of a being, in its defining it will then guide all proceedings and engaging of that problem, thus revealing itself as the most practical thinking. In other words, Heidegger incites us to engage in contemplation at whatever level our concerns lead us.

To summarize, in modernity for Heidegger arises the possibility for complete thoughtlessness, in the sense of the absence of, or lack of emphasis in contemplative thought. The question of Being, regarding the Being of beings, having been answered by modern metaphysics in the mathematical projection of nature, grounded in the subjectivity of the subject, disappears precisely by opening the constant productivity that appears in the process of the development of the factual knowledge of the sciences and the concomitant and constant progress of technology.

In the predominance of calculative thought in the objectification of all that is, everything comes to a stand as valuable resources within the willful ordering of the

human drive to know and command everything as standing reserve. In the discovery of lawful causal relations, mathematically representable and verifiable in experiments, science can plan and assert an amount of control over nature, resulting from the partial ontological reach of its theories. All that is stands and is precisely in the values posited by will to power, in basic concepts, so that the eminent subject stands under all bringing forth into Being, in the production of knowledge in the calculations of valuative thought, and of mathematical representing.

Again, now the farmer stops being a cultivator, as the one who properly takes care of plants and animals in order to fulfill human needs, and indeed reap a reward. Now the farmer becomes a grower or a livestock operator, a position that ends up bringing about the devastation of all that are involved: the plants genetically modified, so they can withstand poisons and don't die; the cows, which are constantly fed antibiotics, since constantly in danger of being sick because of their diets and conditions of living; the fields, eventually rendered sterile with chemical fertilizers, which then percolate to the ground water, and end up polluting brook and sea; and the producer himself, who becomes a mechanic in service of financial and industrial interests which have nothing to do with farming and health, and all they care about is to extract a profit.

And clearly here lies a critique that has been levied, in many different guises, against modern culture, that is, that the environmental problems of Western culture develop right because the human being has become the being who arises to be the master of all beings, with an attitude of greed, lust for power, disrespect, and ungratefulness.

This unbridled, unrestricted sense of rightfulness of the human being not only to use things, which indeed the human can and must use, but doing so with no respect or

gratefulness whatsoever, happening only in view of our ever expanding technological capacity of bringing all that surrounds us within our productivity to satisfy our desires, in a mood of aggressive, cruel exploitation of everything, humanity included, without any questioning thought regarding what is that we are doing. That is, pervasively, all this happens in the deracination of any question regarding the Being of beings, any ontological question that is not mathematical already, that is, calculative.

Yet the brook still flows in our presence, still transcending its mathematization as an object, or mere resource, being more than its accountability to the measurement of the cubic feet/second of its variable flow, and the charted rhythm of this variation, or the quantity of all that which it transports, or the life that it supports.

These being all valid things to know about it, valid approaches, the question arises, do they cover all that the brook *is*? Can the being of the brook be completely covered by the evaluation of how much we value to have the brook there or not there, in which listening to the sound of the brook is a value to be evaluated in this evaluation, while the straightforward, intimate relation of brook and human becomes secondary, a matter left to the subjectivity of poetry, to mere opinion.

In the main, the brook is allowed to be there, only in that the human can evaluate its benefit in this relation. Still the question persists: can this evaluating cover all that the brook is? The answer is, now, that it does, standing there ready to be used or abused, in whatever ways humanity calculates its worth.

To be sure when and where the brook still flows, there its sound still reaches us, as comforting and gentle or as a deafening roar, its happening now is a lived-experience, and when recounted an anecdote, since by now chances are the brook might have been

dammed, blocked, diverted, dried up, silted or paved over, as delineated within human calculative planning, whence all decisions regarding the being of the brook now properly belong.

Everything becomes for us a mere resource to be exploited in the sense, first, as an achievement on the part of human ingenuity, and second in the sense of using not only to take care of our needs but for our own advantage and benefit, for a selfish advantage that must be maximized as profit, regardless of anything else, at any cost, at the cost of the ravishing of the earth itself.

The very fact, for instance, that trees *are*, that they exists in such a way that we can utilize them as building materials, or as paper, this fact, that the trees *are*, and in their being are so useful, even essential to our survival, is rarely contemplated and appreciated, and why should it be?

The forests become, as Heidegger puts it, not even natural objects, but standing reserves, standing there only in view of the optimization of their growth cycle and harvesting in monocultures, regardless, for instance, of any negative effects these might have on the biodiversity that mixed natural forests support; and even, more tellingly, with no sense of appreciation or even wonder that they exists at all, and are in their being so useful to us.

After all, trees are merely the product of evolution, and this mechanism of evolution that provides for diversity and thus for the variety and resilience of life just happens. Though contemplating such a mechanism brings one to wonder, that is, to question regarding the “just happening” of this mechanism. A line a questioning which eventually brings one to question, what is that which we call nature, life? Or why

evolution is? How and why life is? And why and how evolution arises and happens in the way that it does? These are questions which have been answered, yet they are questions still open to be contemplated, which is what Heidegger would like to inspire us to do, to follow our wondering questions.

After all, is it not matter for thought that, currently, the most talked about concept in the environmental field, sustainability, has been so difficult to define? The difficulty in defining sustainability can be understood from what Heidegger calls the lack of ontological questioning, the lack of contemplation regarding the essence of things, the lack of philosophy so understood as contemplative thought, as ontological thought.

Indeed the question of what sustainability might be, involves the clarification of humanity's relation to nature, and this clarification involves the answering to the question of what nature is, and what the human being is, that is, the definition of the essence of the human being and of nature. These are the very questions that have been contemplated and answered in our philosophical tradition.

The answers humanity has given to these questions are our history, are who we are, and have brought us to the point where, among great technological advances, we fear life on planet earth might be jeopardized irreparably, or that future generations will find it harder to just survive on the planet.

Then it appears to always be a good time to appeal to a return to contemplation, to emphasize the practice ontological thought and questioning in environmental studies, or any scientific study for that matter. How do we account for the phenomena one calls nature, the being of nature; the phenomena one calls evolution, of which we ourselves are part, in view not only of the answers others have thought and researched about these

fundamental questions, but fundamentally in view of the phenomena themselves, of all that pertains with them. So that each one of us contemplating such questions and what they address can eventually come to take a stand regarding these matters, can come to working answers regarding these difficult questions, and that is, regarding the phenomena themselves.

This reading of Heidegger's phenomenological hermeneutic of the history of Western philosophy wants to highlight the relevance that philosophy, that is, that contemplative thought, that ontological thought has for science in general and for all the sciences, and thus appeal to its advancement in all education and especially in science education.

Ontological thought, contemplation does not mean an avoidance of action, but the return to foster and appreciate the thinking that considers and ponders the fundamental assumptions of modern science, and of all the branches of science: that thinking that is ontological, that is, that regards the Being of beings, or the Being of each domain of beings, that is, that thinking that ponders upon the ground for the validity of any assumption in view of the phenomena they aim to account. Indeed it is the thinking that attempts to clarify and define what science is, that which guides science in general, and all its specific researches, and indeed that can contemplate the very meaning of our lives.

In the *Memorial Address*, Heidegger writes that there are “two kind of thinking, each justified and needed in its own way: calculative thinking and meditative thinking” (DT, 46). Calculative thinking happens in the activities of all the sciences which plan, investigate and research but it is properly in meditative thinking, in contemplation, that that which guides, principles, definitions, assumptions, in science as in ordinary living

come to be articulated and elucidated. Heidegger's works, his “ways” incite us to keep our questioning gaze in this direction.

CHAPTER 6

Two Examples of Contemplative Thought and Conclusion

In following Heidegger's instigation toward contemplative thought, I will outline two examples. Contemplative thought can be directed not only toward the question of Being, that is for Heidegger toward what is most general and closest to us, but in that contemplative thought, that is, ontological thought, is present at the base of any knowing regarding anything, contemplation can start anywhere, regarding any domain of beings, such as all the branches of the sciences, or regarding any existential, or social situation, or any problematic, topic, or issue. To articulate the basicity of ontological thought regarding any science, I briefly delineate two specific examples concerning with the sciences of ecology and economics.

As articulated above, Heidegger contends that ontological posits are essential in any domain of the positive sciences, for the positive sciences have to define the Being of the entities, they take as the circumscribed area that they aim to study. The nature of those entities, the essence of those entities, what they are, must be somewhat clarified in advance, so that, those entities can be found at all and engaged in the ways pertinent with their definition, their nature, their being.

Obviously each science has to define the natures of the entities under its scrutiny, their fundamental nature is to be somewhat defined, so that the sciences can proceed in experimental research. In this sense, the definition of the nature of the entities under study precedes the experimental results; they are indeed the assumptions, the synthetic, a priori propositions that make possible the experiments. In other words, ontological

thought provides guidance to calculative thinking and its methods, which then provides verification to ontological thought, and thus it spurs its advancement.

Moreover in taking heed to Heidegger's ways, ontological thought can be understood to be carried using the phenomenological method, that is, ontological contemplation does not run to results but considers the nature of the phenomenon, it is descriptive of the nature, the being of the phenomenon. It is an effort to describe the phenomenon in a sort of spiral by which it moves toward an increased clarity regarding “what” the phenomenon “is”, which is gained by observing the phenomenon in continually questioning ways. That is, how the phenomenon appears to us, how it presents to us. Is the phenomenon perceivable by the five senses? And if not, how is it known? What and how is already known about it; what is still unclear of it; and what is most clear about it; and on what evidence is this clarity based, that is, what basic assumptions are already in place as commonly understood about the phenomenon. So that especially what is most obviously understood about the phenomenon should be brought to questioning, that is, regarding the evidence and validity of the obviousness of this knowledge.

In other words, ontological thought, in that it questions what is most obvious and most sure about something, it is always radical, it must reach toward the root, the ground, by describing the nature of the phenomena under study, that is, for Heidegger an interpretation of the being of the phenomenon. And this interpretation, this description, must stay observant, in however ways appropriate to each phenomenon, toward the phenomena themselves, before any theory is proposed, and in view of any theory that is already in place.

It is notable that most of the literature about these examples emphasize in their introductions the philosophical dimension of the work there articulated. One could conclude that philosophy, as Heidegger articulates philosophy, as the thinking of the essential of any phenomenon, is really a moment of scientific proceeding, but given the fact that it appears “speculative”. And in view of the common, current priority given to calculation and its ability to predict the results in experiments, has somehow lost its fundamental relevance, not so much in actual science, where it still happens and must happen, indeed so that theories and hypothesis can be stated, but in how science is taught, usually as that brief moment when the ontic posits of a science are put forward, and almost in the same breath, they are right away brushed aside.

Indeed the scientists who work at the cutting edge of their disciplines must engage in questions that are philosophical, that is, ontological questions that pertain with the basic nature, the basic concepts by which any phenomenon is fundamentally understood.

And here it should be pointed out here that the main work of Kuhn, *The Structure of Scientific Revolutions*, aims to articulate in detail precisely such a fundamental moment for every science. Indeed it is in this realm that science must move (and for Kuhn we do not know as if in progress toward the truth) in scientific revolutions of paradigm shifts, where the ontology of a certain phenomenon, the basic concepts by which a phenomenon is basically understood undergo radical reevaluation and change.

6.1 First Example Taken from the Field of Ecology

A New Understanding of Arid Grassland Deterioration from Managed Grazing

Always in view of Heidegger's consideration that contemplation does not have to be engaged in view of the question of the Being of beings, but that contemplation of the nature of things can be directed toward any situation that concerns us, in any field of human endeavors, here is an example drawn from the field of ecology.

This relates the work done by Savory in relation to the issue of land deterioration arising with the introduction of domesticated grazing animals in arid climates. Savory was raised in what was at one time Rhodesia, where he saw, firsthand, the deterioration of the land after the introduction of managed herds of herbivores. The prevailing understanding placed the culprit of the deterioration on the number of animals grazing the areas involved.

Yet through his own experience of the land and the local knowledge of its history, Savory knew that when wild large herds of herbivores roamed these very areas, the land would support them with prolific vegetation. The culprit of the problem, that these lands would become barren and deserts overtime, was attributed to overgrazing, thus the solution was either the reduction of the number of animals, or having the land rest, precluding their access to any animal. Yet these solutions did not work, even to the point where the land that was rested from any grazing deteriorated faster.

These lands are located in arid climate with 10 to 15 inches (254 – 375 mm) of rainfall per year or less, usually distributed between long dry spells, also with long spells of low atmospheric moisture. Thus the idea of overgrazing made sense, even though the results, the exclusion of any grazing animal, spoke against it.

This was a deep concern for Savory, who had known these lands had historically supported large herds of buffalo, of elephants, of antelopes, of wildebeests, and zebras.

Because the circumstances of his life took him to travel and roam this land, Savory sharpened his observations of the behavior of animals, the conditions of the plant communities present in specific tracts of lands where certain herds would roam, and so forth. In other words, Savory had the opportunity to directly observe over many years the phenomenon of the environmental deterioration of these lands, but also the behavior of wild herbivores and plant communities. Throughout, he kept contemplating the question of why with the introduction of managed herds, the land kept deteriorating.

The insight that answered his question came by observing wild herds grazing in the presence of their natural predators. Savory observed that large herds of wild herbivores would not stay in one place more than a few days (Savory, Butterfield 1999, 42); and that as a defense against predators, they would keep tightly close to each other.

These behaviors were different from those of the herds of cows with no wild predator present. These would spread and stay in an area longer, unevenly eating the plants' populations growing in that area, meaning they would eat more of those they preferred, not touching those they did not like. On the other hand, the wild herds, under the pressure of predation, in their defense tactic of keeping compact, would eat equally from all vegetation, they defecated and urinated in a tight area, and they trampled that area because of the existing alertness to predator's presence, thus they created an effect of disturbance on the soil and the plants.

The effect of this disturbance, this trampling, was that old woody parts of some vegetation (the ones usually not eaten by cows) were broken and dispersed on the ground as a mulch, while seeds were shaken loose from grasses and compressed in the soil by the hoofs of the animals. This was very similar, Savory realized, to what farmers do when

planting. They shake the ground loose first, then plant the seed, slightly compacting the soil around the seed and lightly mulching the area, and that is what the animals were doing, in a patch of land soiled by their excreta, which then forced them to move to a cleaner area. And here the timing of their movement was critical since if the herbivores remained on a same area too long, they would trample and compact the soil too much, hampering the growth of older plants and the sprouting of new seeds. While when the herd left at the right time, when the meager rainfall would then come, it would find a fertilized and cultivated soil, thus the moisture would spur the growth of older plants and the sprouting of new seeds.

Savory thus realized that the problem was not the presence of too many grazing animals, and thus the solution in their reduction or exclusion, it was the absence of the presence of predators and the pressure they created on the behavior of the herds. From here he set out to demonstrate this insight in managing herds by corralling them in concentrated areas for short periods of time, and keeping them moving in such a fashion. By working with farmers open to this approach, he learned to refine the timing and the applicable techniques to move the herds as if natural predators were present. Over time, Savory had the opportunity to experimentally prove the correctness of the insight on this problem, which affects also many areas of the arid plains of the Western United States.

One can say that contemplation is not just thinking about what something is, but it is the approach to an issue which, keeping the question open about its being, strives to become familiar, to know as much as possible regarding the issue, in all the ways and aspects the issue itself, the phenomenon presents itself, aiming to reach an insight regarding the nature of the issue. All this without rushing to conclusions, but staying with

the phenomenon itself, as Savory had the opportunity to do.

One could even call this approach phenomenological, in that Savory, keeping vigilant in his observing, allowed the phenomenon to speak to him without rushing to hasty conclusions. This, Heidegger contends, is the constant danger of modern science in which the emphasis on the predominance of the thinking subject in proposing hypothesis, in rushing to these, does not stay with the phenomenon itself long enough, to let us become closer to the phenomenon through its observing, in whatever ways the phenomenon can be observed, so that it opens itself to us, in view of our fundamental questioning regarding it, that is, regarding its being.

In this case, a possible new understanding of the nature of the deterioration of arid and semi-arid grasslands happening with the introduction of modern livestock farming in rangelands.

6.2 Second Example Taken from the Field of Economics

What is the Nature of Money? An Ontology of What Money Is

I consider here one fundamental entity in the domain of economics, that is, money. Money is observed to be the means by which all exchanges are carried, money is by definition the means for exchanges. Money is central to our current economies, in such a profound way that its hypothetical, absurd disappearance would bring the economy to a halt, with barter unable to even begin to achieve what money has been able to create for all commerce and for human survival.

Yet the question posed here is what is money? And of course the answer is given

by economic textbooks. This definition is usually articulated in three functions, that money is a neutral medium of exchange, a standard unit of account, and a storage for wealth, a store of value.

Moreover money can be a commodity based unit of account, that is, based on crops, precious metals; or fiat money, money based not on a commodity but on the sheer act of an authority, a government, a monarchy, to provide a single national currency binding for all commercial transactions. This last, fiat money, is the standard for the current global economy. Money can be further analyzed as coinage, paper money, commercial bank money, digital money, etc..

In the current economics books, the question of what money is, is usually constricted to the question of what financial instruments can be understood as money, in view of their susceptibility to liquidity, that is, how fast they can provide power of purchase in the market place. But this analysis is not what is asked here, and that is regarding the nature of money, the simple question, what is money?

First of all, money is not a thing of nature, in the sense that there is not such a thing with intrinsic value either as a crop or a bar of gold or copper. What is there are the things of nature and their usefulness to the human being for whatever reason-survival, play, work, adornment, amusement, etc., which gives value to anything. And this value can be expressed in a medium of exchange, so that things can be exchanged, in the value expressed by money, by the unit of account, which is agreed upon by both party of the exchange to be money, in the specified amount of the price.

In other words, money does not grow on trees, even though one day leaves could become the legally established currency. Money is a human agreement, a human

construct. It is the designation of a thing as the medium for exchanges; however this thing is chosen to be, however it is structured to work.

In *The Future of Money*, Lietaer points out that “Economics textbooks deal with the question of what money *does*, but not with what money *is*” (Lietaer 2001, 47). Lietaer then asks the “deceptively simple question 'What *is* money?’” (Ibid., 47). Here Lietaer is asking regarding the ontology of money, the being of money, the nature of money. As said before, in economic textbooks, money is defined as a medium of exchange that is neutral to the exchanges, this is what money does. Lietaer defines money as “an agreement, within a community, to use something as a means of payment” (Ibid., 41), that is, he comes upon what he considers the nature of money as a social contract, an agreement upon which a community decides on a thing as a means of payment.

One way to consider the solidness of this answer, that money is a social agreement, is by regarding the origin of money, that is, the answer to the question of how money originated can lead to the evidence of the answer to the question of what money is. As Benes and Kumhof put it, in their research paper *The Chicago Plan Revisited*, “Any debate on the origins of money is not of merely academic interest, because it leads directly to a debate on the nature of money” (Benes, Kumhof 2012, 13).

The usual history of money is that at some point in the past, tired of the travesties of barter, people hit upon the factual idea that some goods can, not only be goods, but a way to acquire anything and do away with the coinciding of need and want between two parties in barter, that is, a specific goods can become readily accepted as a means for payment by everyone, at every exchange. Recent anthropological research finds no evidence for such a story.

Nenes and Kumhof quote the monetary historian Alexander Del Mar (1895) as they write that “As a rule political economists do not take the trouble to study the history of money; it is much easier to imagine it and to deduce the principles of this imaginary knowledge.’ Del Mar wrote more than a century ago, but this statement still applies today” (Benes, Kumhof 2012, 13). Indeed this theory of the origin of money has been and is still widely held as having reality, even though the historical evidence is wanting.

Recently another theory is gaining predominance based on more recent research, which finds no evidence that money come into being to solve barter problems, that is, “that money arose in private trading transactions, to overcome the double coincidence of wants problems of barter” (Benes, Kumhof 2012, 13). That is, money has been usually understood to come about historically as something with intrinsic value, such as precious metals, to greatly facilitate existing barter systems.

Recent studies put forward another interpretation of the history of money. Benes and Kumhof summarizes it, by writing that

Barter was virtually nonexistent in primitive and ancient societies, and instead the first commercial transactions took place on the basis of elaborate credit systems whose denomination was typically in agricultural commodities, including cattle, grain by weight, and tools. Furthermore, Graeber (2011), Zarlenga (2002) and the references cited therein provide plenty of evidence that these credit systems, and the much later money systems, had their origins in the needs of the state (Ridgeway (1892)), of religious/temple institutions (Einzig (1966), Laum (1924)) and of social ceremony (Quiggin (1949)), and not in the needs of private trading relationships (Benes, Kumhof 2012, 13).

In other words, money, at its origin, appears in the form of accounting of credit and debt, based upon an authority, or leadership, or communal belief. For instance, Lietaer, in defining money as medium of payment and not exchange, makes the nuanced distinction between payment and exchange, in that payment “is able to include transactions which have ritual or customary purposes. For instance Balinese societies

count Time as a form of payment for community projects (Lietaer 2003, 6). Before there can be money, there must be exchanges or contributions toward the community, for projects or rituals, and thus the need for a way to keep count of such activities; this need appears to have been inceptive for credit systems that predate money proper and its function in private exchanges.

Innes points out that the first kinds of money were not “intrinsically” valuable, like gold or silver coins, but were just tokens to keep account of exchanges, as simple as a note on which a written record is ascribed, a tally (Wray 2006, 40). For instance, in Medieval Britain money was a “stick of squared hazel-wood, notched in a certain manner to indicate the amount of purchase or debt” (Wray 2006, 40-41). This was done so that “The name of the debtor and the date of the transaction were written on two opposite sides of the stick, which was then split down the middle in such a way that the notches were cut in half, and the name and the date appeared on both pieces of the tally” (Wray 2006, 41).

Historical evidence shows that money came to be as an agreement to tally ritual and communal contributions, and exchanges; in other words, what is of “value” is the exchange or the contribution for which a credit and a debt are created, in the tally of the exchange. Supported by shared agreement, these tokens represent the value of the exchange or contribution, so that now these tokens can be further accepted as medium for payments, that is, they are agreed upon to be a value in view of the original transaction by which they come into being, to keep record of the private exchange or customary contribution.

Today the form in which the shared agreement regarding money takes place is that

money is created as something that has value as medium of payment by decree of the state government, and is created *ex nihilo*, out of nothing, *mostly* by commercial banks, backed by central banks. In other words money is now not representative or backed anymore by something considered valuable, i.e., a commodity, but is *fiat* money, money made legal by governmental decreed and is thus supported by the shared agreement of all the citizens of a country believing in the value of its national currency, whose ability to be created is delegated to commercial bank overseen by the policies of central banks. This agreement, Wray contends, is maintained as a monopoly by law and practically by having the national currency as the form by which taxes are to be paid (Wray 2006, 36).

When money is understood as an agreement upon a designated medium for payment, however sanctioned, and not as something with “intrinsic” value, one key question is, who has the authority to control the emission of money? In other words, since the origin of money is as a socially agreed upon medium for payments, how does it come into being, that is, who creates money and how? The answer to the question of the origin of money, then, has, as Benes and Kumhof put it, “a critical bearing on arguments as to who should *control* the issuance of money” (Benes, Kumhof 2012, 13).

The current and usual answer is that it is the government, in the form of the central bank, that can inject new money by buying assets, bonds, etc., on the market, but mostly the central bank provision is to influence interest rates and set banks reserve requirements which aim to influence and guide the emission of new money by the commercial banks, which are the entities which do create new money.

In other words, currently banks are understood as intermediaries between money that is not used, the savings, as reserves stored with them, which they put to use through

loans, through the fractional reserve system. Simply put, the fractional reserve system expands the bank activities beyond taking the money that is not used and put it to use as loans, in that banks can create new money in excess of certain level of reserves, which are a fraction of the money banks can create as loans. Commercial banks are the central engine of money creation, somewhat overseen by the national central bank.

In this regard, Benes and Kumhof articulate the key to their theoretical model, in view of this central issue of modern economies, when they write that

The critical feature of our theoretical model is that it exhibits the key function of banks in modern economies, which is not their largely incidental function as financial intermediaries between depositors and borrowers, but rather their central function as creators and destroyers of money. A realistic model needs to reflect the fact that under the present system banks do not have to wait for depositors to appear and make funds available before they can on-lend, or intermediate, those funds. Rather, they create their own funds, deposits, in the act of lending. This fact can be verified in the description of the money creation system in many central bank statements, and it is obvious to anybody who has ever lent money and created the resulting book entries. In other words, bank liabilities are not macroeconomic savings, even though at the microeconomic level they can appear as such. Savings are a state variable, so that by relying entirely on intermediating slow-moving savings, banks would be unable to engineer the rapid lending booms and busts that are frequently observed in practice. Rather, bank liabilities are money that can be created and destroyed at a moment's notice. The critical importance of this fact appears to have been lost in much of the modern macroeconomics literature on banking, with the exception of Werner (2005), and the partial exception of Christiano et al. (2011) (Benes, Kumhof 2012, 10).

In delineating the ontology of money that sustains their model of the economy, by which they try to propose a revision of the Chicago Plan, Benes and Kumhof assess that in reality, it is mostly by the commercial banks, that is, private institutions, that money is created. The alternative approach to solve the current economic problems, they propose in the revision of the Chicago Plan, relies upon the recognition that money creation has been given to the private banks, and thus to return this function, not only in the present form to influence by regulation the creation of money, but the full function to create

money to the government, that is, to a public institution, responsible toward the electorate, the public.

Indeed money can be created in various ways. The two main approaches of recent history, to the detailed managing of such vital function of the creation of new money or its destruction, has been carried by the government, that is, public institutions, or given to private corporations, to commercial banks, to private financial institutions.

To be clear, modern-day banks are not intermediaries between existing money and new money, that is, between savings and loans; under the fractional reserve system banks can create new money and destroy it. Commercial banks have been given the privilege to create money. This happens in the form of loans, by which new money is created in the economy, as debt to be repaid over time with interest.

The *Chicago Plan Revised* is a plan to return the prerogative to create and destroy money to the government, to the Treasury, and to eliminate the fractional reserve system, and to back all deposits 100% by government notes. This plan, as revised by Bennes and Kumhof, aims to squarely nationalize money, and keep banks private as providers of money transactions and creation of credit, based on money, now originating in the US government and not by the bank themselves or the semi-private in theory, but de facto private, that is independent of public interference, technocratic Federal Reserve.

To summarize, nowadays, new money is created by private commercial banks, backed by the reserves of the bank, as a fraction of the whole loan. So that practically, as Kumhof realized working as a bank manager, money is created as a loan by making an entry into a bank account, usually against some asset of the borrower. What is key though is to consider that money is created in loans to borrowers as debt to the banks, thus to be

returned with interests. This has profound implications that have been debated for a long time, for instance in the question of what usury is, that is, excessive interests or to have interests at all.

The key issue considered here is the fact that banks, private enterprises, can create and destroy money. Money is created as debt, that is to be returned over time with interest, to the banks. Though banks can do that because the government has delegated this function to them, and this is because the government has sovereignty over its own currency, indeed it is the only entity that can legally levy taxes.

This is the central point upon which turns the Chicago Plan of economist Fisher. Returning the power of money creation to the public sector, and thus retaining the prerogative to invest and spend into circulation as deemed necessary by representative of the public; yet retaining private banks by permitting them to lend and create credit, but now as real intermediaries between accrued and saved money, that of investors, and new or any business that needs funding for inception, maintenance, expansion, improvements, etc..

This question regarding the prerogative of money issuance has played itself out in the history of the United States, and can be researched in the legislative record of banking, for instance in The Bank Bill of 1791 (two bills passed by the First Congress of the United States in 1791), in The National Banking Acts of 1863 and 1864, and throughout the formative years of the United States. The issue at stake can be easily observed to be if the issuance of money was to be in the hands of the government or in private hands.

The Constitution of the United States is ambiguous regarding this point, as article

1 section 8 states, both, that it is in the power of the government to oversee the direct coinage of money, and also that the United States can incur into debt. Even though Natelson reaches an interpretation of the Coinage Clause in clear favor of the fact that it meant to give the government power to create money and give it value thereof (Natelson 2009).

This basic, fundamental question for a commercial society, remains, who is to have the control of the emission of money and its destruction? The answer is in the system in place today where money is created by the commercial banks which are overseen by the policies of the Federal Reserve, while the government, to procure money beyond taxation, emits bonds, that is, it borrows money on which it needs to pay an interest.

Within his analysis of monetary systems, which does not accept as a must but questions the private creation of money as debt, Lietaer delineates certain implications of the current monetary system, where money is created as debt. For instance he considers that one essential feature of bank-debt fiat money is that “Debt-money derives its value from its scarcity relative to its usefulness” (Lietaer 2001, 47). So the controlled scarcity of money is a requirement for the value of money. The scarcity or relative abundance of money is ultimately controlled by the policies of the Federal Reserve System and the activities of commercial banks.

And according to Bennes and Kumhof, these activities, the propensity of banks to make loans or not, creates the boom and bust cycles, the oscillating periods of economic expansion and contraction. They write that

the creation of a nation’s broad monetary aggregates depends almost entirely on banks’ willingness to supply deposits. Because additional bank deposits can only be created

through additional bank loans, sudden changes in the willingness of banks to extend credit must therefore not only lead to credit booms or busts, but also to an instant excess or shortage of money, and therefore of nominal aggregate demand (Benes, Kumhof 2012, 6).

Moreover, Lietaer considers the implication that when a loan is given out, it is given out with the provision that it will be returned with interests, but the bank only puts out the amount of the loan, not the full amount to be returned with interests. So that when a loan is put out the person/company loaning the money will have to compete with all other persons/companies to “win” the extra amount that has to be returned as interest. Here Lietaer then makes the case that constant growth, that is, the modern cry of the current economy, must happen because new money has to be created constantly by new loans in excess of the loans that are due to be returned with interests.

In other words, Lietaer considers that this creates the conditions for competition, so that the idea that competition is a “natural” state, or the most efficient way to have growth, Lietaer explains, is really the way the monetary systems works, pitting all against all, because money is created as debt and is kept scarce for keeping its value high. This is in the interest of banks but not in the interest of productive firms which tend to want to pay their employees well, in order for them to have the money to pay for the goods and services produced and offered by the firms; and furthermore if the firms need investing, they want to take loans out at low cost.

Lietaer considers that competition is spurred by keeping money scarce, and created as debt, so that economic entities have to find the extra money needed to repay a loan with interest. This creates a situation when concerns for survival, that is, for financial survival, for the individual or corporation, are put before any other consideration, for instance for the environmental impact of their activities. That is,

companies are forced to lower their costs or externalize their costs as much as possible, with the double effect of being spurred to greater efficiencies, but also to prioritize their expenses and thus to bypass certain costs, for instance, the extra costs of ameliorating whatever environmental impact/cost their activity is known or can possible have on the environment.

Another effect of the current monetary system is that, by having private, commercial banks create money as debt, one leaves, for the most, banks to carry out, as the CEO of Goldman Sachs' Blankfein recently put it in a public interview, "God's work", that is, to invest. What Blankfein meant is that when banks loan money they provide for whatever that loan is for: a new house, a new factory, a new business or expansion of that business, to come into existence, to come into being, thus the metaphor of God's work. Now the criteria by which a project is going to have the loan, thus permitting its coming into existence, is decided by whom? By the banks according to the highest probability of the borrower to be successful and return that loan.

Thus from the understanding that commercial banks are given the function to create money as loans, and that the government has relinquished its power to coin money and must borrow money, beyond what taxation can provide, the issue arises regarding how investing happens. Given the great power of investing, indeed as a form of the manifesting of new ideas, new things, and thus directive of future possibilities, the question arises if the government, and that is the elected representative of the people, be restored to a more predominant role in the monetary policies of investing, which is to say, in money creation.

It would appear that we will all better served if, for instance, the decision process

of investing would become more open and responsive, in whatever ways, to the concerns of the people and the places it affects, that is, in view of its social and its environmental impact, that is the well-being of peoples and the natural world, the true bottom line beneath which the whole show comes to a screeching halt and wherein all bets are off.

The scope of this example is not the place for a detailed discussion of this basic issue of monetary ontology. For instance, debating the argument that the government's issue of money, debt free, will eventually cause galloping inflation, when there are recorded examples in the history of the United States that demonstrate the beneficial and well managed use of the power to create money, that is debt free, be it metal or paper money, by the government.

This is not the place to account for how the history of banking transpired and become the current banking system. But to highlight that just like the story that money came into existence to help solve the problems with barter is losing credence as lacking evidence in most recent archeological and anthropological research, so is the storyline that the government is not capable to directly manage its own currency, as the contrary is supported by recent research in the history of banking in the United States. In other words the government can create money as debt free currency, and research in this matter has evidence that this did not always end in a frenzied and galloping inflation. The issue, in this brief discussion, is to highlight the importance of ontological questions and their answer, in this case, the ontology of money.

In other words, in pondering about the nature of money, it becomes apparent that how money is understood to be is a key aspect in guiding the way a monetary system is structured and operative, which in turn deeply influences a great deal of current issues

that affects all people, it has a great influence in all aspects of modern day life. And this should be enough to motivate one to question regarding the nature of money, that is, how the nature of money is to be understood.

In this direction, possibilities can range from simply more governmental regulation and enforcement, the approach that is taking place presently, as a result of the financial crises of 2007-2008, to the more radical one of returning the prerogative of monetary creation and policy to the Treasury, for instance as delineated by the Chicago plan revised, or by the National Emergency Employment Defense (NEED) Act (H.R. 2990), introduced as a bill by Congressman Dennis Kucinich in 2011, which, for the record, did not pass the committee stage.

To summarize, one key matter regarding the economy is the ontology of money, and when money is understood to be a social agreement upon a medium of payment, however this is designated, the basic question becomes who is to be in control of the money supply? Followed by all the questions that arise in that answer, for instance, how this specifically takes place, under what terms and conditions is this control yielded, for what purposes, and so on.

As Zarlenga, who worked on the above mentioned bill, articulates in a speech given to the US Treasury in 2003, how the concept of money is defined “usually determines whether the system will be publicly or privately controlled. So there is a lot at stake in how a society defines money”. So throughout the history of banking in the United States, as Zarlenga bluntly puts it, “the real question in practice was whether it would be private banks or the government that would create paper money. Will the immense power and profit of issuing currency go to the benefit of the whole nation, or to

the private bankers? That's always been the real monetary question in this country”
(Zarlenga 2003).

In other words, when one contemplates the current monetary system in view of the ontology of money, regarding the nature of money, one realizes the vast and profound impacts these decisions regarding what money is and how it works have on all aspects of daily life. The monetary system of the global economy even appears to drive our lives, not only in the calculations of micro and macro economics that inform policies and regulations, but from their ground concepts, that is, from their ontological underpinnings for which no calculative thinking is required, but a thinking that is ontological, the thinking that sets up all calculations, the thinking regarding what something *is*, in this case, regarding what money is, that is, regarding its nature, its Being.

What this brief example wants to underlie is the guidance that ontological questions and their answers provide. This brief specific example regarding the ontology of money wants to show that beyond the real complexities of a national or global economy, one finds the very simple ground, where the foundational definitions are articulated guiding the understanding and the very manifesting of those phenomena. In other words, all the complexities of the economic field, which are represented in mathematical models, are found within an ontological understanding of the economy of which money is one essential factor, together with such simple and obvious questions as what the economy is, what is supposed to fundamentally achieve, and before that, if indeed does have a purpose, etc..

These questions have been answered already, in the economic system in which we all stand. The answers that are already in place, so that we know what money is, and what

the economy is, these are obviously known, until one person does not find it obvious and starts to question anew the ground concepts that define what something is, what money is, what light is, what evolution is, that is, asking regarding the nature, the essence, the Being of these phenomena.

What is here proposed through the study of Heidegger's works is its invocation toward more contemplative thought. What scientific education is missing is an emphasis on the importance of contemplative thought, the thought that contemplates the nature of things, and which is an essential moment of all science, of all knowledge. Indeed ontological thought, even though, not practical right away, eventually provides the basis of all practicalities.

Thus in view of all the environmental and social problems that afflicts our world, the call here is to foster better science education by emphasizing philosophy, ontological thought, contemplation, in view of the critical role that fundamental assumptions, that basic concepts, play in any knowledge whatsoever, and thus in modern science, in all its branches, before any action, or calculation is undertaken.

That is, the call for better science education is answered by proposing to foster a more contemplative approach to any subject matter, that is, of its ontology, indeed a crucial moment for any knowledge. It is in the clarity of the evidence of ontological knowledge that science, knowledge proper in the modern sense, truly proceeds.

6.3 Conclusion

The Circularity of Experience as Knowledge: the “Between”

To conclude, I use Heidegger's end of the lecture *What is a thing? Basic Problems of Metaphysics*, in which he interprets Kant's approach and answer to the question of Being, now fundamentally approached in the relation between the subject and the object, that is, for Heidegger, in the “between”.

In his interpretation of the *Critique of Pure Reason* as the work that attempts to articulate the understanding of Being that underlies modern mathematical physical science, Heidegger articulates that the Being of beings is now understood in terms of the objectivity of objects which comes to stand on the subjectivity of the subject; so that the grounding for modern mathematical science as objective comes to reside in the subjectivity of the subject.

In other words, the objectivity of the objects is rendered possible by the subject understood by the most basic cognitive faculties of the human being, of perception and thought. Thus the objectivity of objects is made possible and thus identified with the circumference delineated by thought and intuition, human representing, a perceptual knowledge mediated by thought. The objectivity of the objects, and this means nature in general, is, in the delineation of what nature is that happens in human cognition: in perception and conception.

Current philosophy speaks in terms of truth being a model of the real, that is, a picture of the real, a mathematical representation realized by the experimental success of its measured results. Before that though, the real is that which can be mathematically projected, so that within this projection theories and hypothesis can be proposed. These then specifically define the phenomenon and predict causal relations within the phenomenon so understood, so that experiments can proceed, and measurements can be

taken to commensurate with the prediction.

As delineated by Kant, the real is mathematically projected by the eminent subject in advance of all theories within which hypothesis are born and which need to be brought to evidence in the experiment. In other words, for all objective knowledge a subject is there also.

The subject as will to power, as will to knowledge defines the fundamental sense of reality, of Being as mathematically representable, as models workable computationally; the model provides an image, it is the viewing of a picture, a representing, that is, a view of the world, a worldview. The holder of the worldview is the subject. The picture, the representing, then must be confronted with the phenomenon, it depicts, in the experiment.

As it has been articulated in this thesis, the key to what modern science is, though, is not only in its experimental nature, but the ontological, the metaphysical, the mathematical projection of nature that guides all the ontic posits of each science. Kant, as all modern metaphysics, grounds the mathematical projection of nature in the subjectivity of the subject, in the human being.

In the Critique Kant asks regarding the fundamental relation between the subject and the object, Kant asks a question that is closer to the human being and that precedes all worldviews, in that it aims to ground the possibility of any representing that is truthful. How is it that a subject knows an object? What makes possible the knowledge that opens all other knowledge in the proper sense of scientific, objective statements, and thus what makes knowledge possible at all? Kant's answer finds human representing composed by perception and thought.

In Heidegger's interpretation of Kant, Being is human representing in the coming together of perception and conception which allows experience, that is, knowledge, to be. Yet the proof is found in experience, in that what is mathematically projected is found in the fact that beings as they appear to us are responsive to be mathematically representable in objective knowledge. Knowledge as mathematical representation finds the Being of beings as mathematically representable, beings *are* mathematically representable. This is indeed a possible way to represent beings, as it is already operative in any science.

Heidegger points out that such grounding of all knowledge in perception and thought in the *Critique*, the proofs and the elucidation of the principles, all present a striking feature, they all move in a circle. He writes that

The unity of thought and intuition is itself the nature of experience. Therefore, the proof consists in showing that the principles of pure understanding are made possible by that which they ought to make possible-experience. This is an obvious circle...Experience is in itself a circular happening through which what lies within the circle becomes exposed (*eroffnet*). This open (*Offene*), however, is nothing other than the between (*Zwischen*)-between us and the thing (WT, 242).

In concluding, Heidegger referring to the Analytic of Principles, Chapter II of Part II of the Transcendental Logic, writes that

The chief difficulty in understanding this basic section of the Critique of Pure Reason and the whole work lies in the fact that we approach it from our everyday or scientific mode of thinking and read it in that attitude. Our attention is directed either toward what is said of the object itself or toward what is explained about the mode in which it is experienced. What is decisive, however, is neither to pay attention only to one nor only to the other, nor to both together, but to recognize and to know:

1. that we must always move in the between...between man and thing;
2. that this between exists only while we move in it;
3. that this between is not like a rope stretching from the thing to man, but that this between as an anticipation (*Vorgriff*) reaches beyond the thing and similarly back behind us. Reaching-before (*Vor-griff*) means thrown back (*Ru:ck-wurf*) (WT, 243).

Heidegger concludes that

Kant's questioning about the thing asks about intuition and thought, about experience and its principles, i.e., it asks about man. The question 'What is a thing?' is the question 'Who

is man?' That does not mean that things become a human product (Gemachte), but, on the contrary, it means that man is to be understood as he who always already leaps beyond things, but in such a way that this leaping-beyond is possible only while things encounter and so precisely remain themselves-while they send us back behind ourselves and our surface. A dimension is opened up in Kant's question about the thing which lies between the thing and man, which reaches out beyond things and back behind man (WT, 244).

This is what Heidegger hermeneutic of Kant's basic philosophical stance in the *Critique* uncovers beyond the mathematical projection of nature that guides Kant's work. The posing of the question regarding experience, as mathematical representing, leads to the question regarding the being human, the being that is asking this question. The question regarding the objectivity of the object invariably relates to the question regarding the subjectivity of the subject; "The question 'What is a thing?' is the question 'Who is man?'" (WT, 244)

The "between" the subject and the object stretches out from the human and the things and beyond them, and from beyond the things back behind the human being, the one who in all comports, in all his doings, always and already is comporting itself in an understanding of the Being of beings, of all the beings as they indeed manifest in the understanding of their Being, which includes the understanding of the being that is human, the being that each of us is. Being is the "between", between the human being and things, engulfing both; at the same time the "between" exists only when we move in it.

The "between" is that obvious, basic understanding of Being, by which we relate and comport toward anything, ourselves included. The "between" woman and thing is each of the historical interpretations of Being, that have transpired from each other as the history of Being, the history that we are.

For Heidegger, philosophy in the proper sense asks regarding what is always

already been answered historically, in the happening of human lives, that which is already operative in all our doings, between us and the things, that which is taken for granted in the obviousness of the daily world, and in all the searches for the truth, for the facts. In this “futile” questioning of the Between, it assesses, it renews, it spurs the self-clarity of an age regarding its own understanding of Being, and thus it reaches for possibilities beyond it.

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