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Metaphysical Presuppositions of Modern Science

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Abstract: *This essay intends to show that science, especially the natural sciences, operate on presuppositions. In a nutshell view of aspects of the history of science the presuppositions, as part of the relevant historical context, operate within the scientific enterprise. Science used to be views as positivist and final; yet, the logic of methodology, from E.A. Burtt to T.S. Kuhn and Karl Popper show that presuppositions are part of the scientific research. Particularly the pioneering work of the archeologist and philosopher R.G. Collingwood and the seminal thinker S.N. Nasr, who opened the doors for the inquiry of the role of science within Islamic Civilization, are highlighted. We show that the tension between the humanities (human sciences) and the natural sciences still exist and need to be explored on a global level, especially as to their cultural presuppositions involved.*

Keywords: *Presupposition, informal logic, history and sociology of science, paradigm shift, logic of social sciences, R.G. Collingwood, A.N. Whitehead, E.A. Burtt, Max Weber, T.S. Kuhn, Karl Popper, S.H. Nasr.*

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Introduction

Until the last third of the 20th century modern science has been dealt with as though it operated without metaphysical presuppositions. In this essay I would like to enumerate several items that are embedded in modern science, namely metaphysical presuppositions. A modern student studying a textbook, introducing him or her into modern physics or quantum mechanics, will not encounter anything about metaphysical items in the textbook, except facts, research results, and equations. The final exam will entail only factual knowledge, but not the conditions of knowledge that made physics, as a modern science possible, in the first place. If any student would ask questions about how modern science came to be, or what are the historical contexts in which science, as a systematized body of knowledge flourished, our student would be referred to history of science and/or sociology of science, perhaps history of philosophy, with special emphasis upon scientific developments. Needless to say, at this point we are interested in the philosophic aspects of modern science. This has not always been this way. Science, generally, up to the 1970s has been understood as a clear cut affair. Science meant no-nonsense, methodology, exactness, measurement, basic facts and empirical reality. Modern science was understood in a positivist mode of understanding the world of nature. Science stood for progress, the wealth of nations, optimism, and invincibility, until Hiroshima unfolded. Science lost its innocence and became part of the military-industrial complex. The original idea of doing science, ora et labora (pray and work), no longer applied. Modern science sold its soul to Dr. Strangelove (the post-modern Faust) and he, in turn, sold it to the devil. With the appearance of nuclear energy we have arrived at a juncture of choosing this energy as a weapon of destruction or for peaceful means, to promote the welfare of humankind. Yet, at this point we want to remind us of a simple truth: science is an organized way, within a specific context, to yield knowledge in terms of truth. Many have forgotten that the scientific enterprise was launched to find the truth as a revelation of Deity.

Newton was still a natural philosopher and searched the universe, as he put it, " When I wrote my treatise about our system, I had an eye upon such principles as might work with considering men for the belief of a Deity; and nothing can rejoice me more than to find it useful for that purpose." (Letter to Dr. Richard Bentley, December 10, 1692; quote in H.S. Thayer, 1965, 46) Clearly, Mr. Newton was not doing modern science, but natural philosophy conjoined to theological conviction. He was not modern, but a thinker trying to figure out the secrets of nature as revelations of Deity. We are now in the center of the metaphysics of nature with its presuppositions. And these presuppositions make up the framework of a Weltanschauung that is part of the memory of civilizations. So far my introductory account of the respective topic is very much a European account of how things went with science. Yet, in order to do justice to a global demand for truth I will sketch my route to another civilization, namely Islamic civilization, in order to show that the conditions of metaphysical presuppositions are much more complex and multifarious than meets the eye. Again, I refer to pioneering efforts of a few individuals in the 20th century that opened up a whole new universe as to metaphysical presupposition civilizations hold. And the scientific enterprise is part of that story. More than anyone else we owe great insights and laborious efforts of the presuppositions in science and civilization in Islam to Professor Seyyed Hossein Nasr. It was due to the efforts of Dr. Nasr, as he is called politely by his students and opened up the Islamic sphere of scientific enterprise and its institutional ramifications. I will sketch that route of an American philosopher with European roots educated, as Dr. Nasr put it nicely, in the German school of philosophy.

West Meets East on The Civilization Highway

When I meet Dr. Nasr in person for the first time in winter of 1989 on campus of George Washington University in Washington, D.C., I had

publications behind me on the British mathematician-philosopher Alfred North Whitehead. Whitehead was my hero since I read his *Science and the Modern World* in high school. I had no idea what the book really entailed, but I had a sense that this was exciting and interesting because I didn't understand it. A hero is to be worshipped not to be understood. Of course, in the long run, any normal adult does want to come to terms with his childhood, rationally. I was lucky to meet Dr. Nasr for at least two reasons: he opened up for me the subtle aspects of Islamic civilizations and its specific traditions, and widened my scope as to the metaphysical presuppositions of the scientific enterprise, especially in the Islamic Orient. At the time I was involved in Newtonian studies, preparing myself for a presentation on Newton, organized by the late Michael John Petry, at Newton's Trinity College, Cambridge, for late August 1989. I had returned from a professorship in Turkey and became acquainted with Dr. Nasr's *Science and Civilization in Islam*. Considering my western educational background and some first time living experience in a country predominantly Muslim I began to sense the importance and significance of that book for me and this pioneering work in the history of science of Islamic civilization. I started to supplement my reading list and scissors and paste approach to global intellectual history at the very transition from paper and ink to websites and internet. At the time the Berlin Wall fell and the demise of the Soviet Union was inaugurated. I was actually more interested in the question: how does the development and framework of scientific activity in Islamic civilization, as outlined by Dr. Nasr, complement and supplement the mainstream account of the history of western philosophy and science, especially the consequences of the scientific revolution? This question, it seems to me, still needs more research and effort spent, in order that we are able to see a larger Gestalt of the specific relationship between western civilization and Islamic lands, ushering from the Latin European Middle Ages and the glorious days of Cordoba, Cairo, Baghdad, and Isfahan.

Although I learned my basic science in high school and undergraduate

liberal arts education my textbooks were straight forward. We had to learn the facts, the equation and what is. No further questions asked. I one time told a chemistry professor that laboratory work was boring because I knew the results ahead of time. He exploded and told me that I had no idea what science is all about and maybe I should transfer to philosophy. I replied that I was actually into philosophy and his face was about to cry or laugh. But he did give me excellent advice, before he died one year later, "... before you go into philosophy take science serious and begin to grasp what the scientific enterprise is all about." That advice from the late Chemistry Professor Van Evera, was something that lead me into an intense interest in how science developed in civilization, what function and role it took on, and how this specific type of intellectual activity related to philosophy proper. I discovered that the first PH.D. in the history of science was awarded to I.B. Cohen in 1947 at Harvard University; at the time it was only twenty years ago. And the history and subsequently sociology of science was inaugurated in the United States by Robert K. Merton and his *Science, Technology, and Society in Seventeenth Century England* published in 1938. No doubt, science in terms of its own history generated a new intellectual discipline. I was excited. I found something that made sense also in terms of philosophy. How could I interlink philosophy, science, and art? This was on my mind and I tried to choose courses and read books that would be of benefit to my understanding in that direction. Religion I took serious as an anthropological enterprise and found the work of the late Clifford Geertz, very fitting. However, this came somewhat later during my second stay in Turkey. His anthropological work on Morocco and Indonesia helped me to come to terms with my lived experiences in Malaysia, Egypt and Iran.

Already in my Colorado high school years I was eager to read a great American naturalist Loren Eiseley. His *Immense Journey* (1957) and *The Unexpected Universe* (1969) read like novels about the wonders of natural processes, fauna and flora life. This was enchanted science that blurred the

borders between poetry, literature, and scientific explanation. And there was Jabob Bronowski, whose western civilization series on public television enchanted the middle classes, promoted a sort of Kultur as a gift from Europe to America; a sort of intellectual care package for America's white middle class suburbanites. I took my first professional history of science courses with Robert Multhauf from the Smithsonian Institute on the history of chemistry. I found the course intriguing and somewhat different from the typical survey course. Multhauf was not an exciting lecturer, he had written a book on the emergence of scientific chemistry, but he was factual and showed great sympathy for a philosophy student like me, who couldn't always follow the graduate level chemistry lessons. There were only a few graduate students and myself, otherwise, no interest in the days of the Beatles, Marx, and Mao. Another lecturer was Nathan Reingold who specialized and earned a reputation as a scholar in science in colonial America. He was the keeper of the Joseph Henry Papers at the Smithsonian. Through Multhauf and Reingold I learned the professional side of the history of science. I always tried to integrate what I learned into a broader picture of philosophy, art and religion. Subconsciously, I suppose, I followed Hegel's dictum that philosophy, art and religion are the same, except their modes of expression. I supplemented my courses with the readings of modern classics such as George Sarton, I.B. Cohen, Alexandre Koyre, Pierre Duhem, or Herbert Butterfield's *The Origins of Modern Science* (1957).

I started to discover the literature on the philosophy of science promoted by one of my teachers Richard H. Schlagel whose own commendable two volumes *From Myth to Modern Mind* (1995/96) are impressive and instructive. We are in 1968 and the student revolt, from Berkeley to Berlin. For the first time I was introduced to Thomas S. Kuhn's *The Copernican Revolution* (1957) and interesting account of the respective topic. At the same time I was reading Kant's *Critique of Pure Reason* in my mother's original language. In my philosophy courses with my undergraduate professor Thelma

Z. Lavine I learned about exiled European intellectuals, from The Frankfurt School (Horkheimer, Adorno, and Marcuse) to the Hungarian sociologist Karl Mannheim. I started to read about these Nazi refugees and their contribution to the intellectual capital of the western civilization and beyond. I heard about the young Karl Popper from Vienna and his classic *The Logic of Scientific Discovery* (1959). Of course, on the front burner of intellectual pursuits, in those rebellious student days, was his controversial *The Open Society and its Enemies.* This added another dimension to my understanding of the search for knowledge and truth; the socio-political aspects should not be left out of sight. Science is not conducted in a vacuum. Thus, the Vienna School and Ludwig Wittgenstein started to take hold of me, but not my mind. I tried to relate the transfer of knowledge from Europe to America. It became clear to me that Europeans understood science in a much broader sense then mid-20th century America. The cultural ramifications of science, art and religion were treated in a subtle way that appealed to my mind. I began to ask, what are the interrelationships between these intellectual pursuits? More and more science was not just simple results of basic data and technological know-how. As a graduate student at Bonn University in the early 1970s I located many "American classics" of science, such as Popper, and discovered much of their work was done already as young researches in the Humboldt Model of University Education, in which I probably belonged to the last generation that got a sense of this kind of universal education before specialization and think-tanks set it. I read with delight the original *Logik der Forschung* published in Vienna 1934. When Habermas's *Cognition and Interest* (*Erkenntnis und Interesse*, 1968) was published and caused a little sensation among West German intellectuals I couldn't understand that because I was acquainted with the exile sociological literature like Karl Mannheim's *Utopia and Truth* (1930). This was not only a unique experience of transatlantic transference, but also a kind of time-machine experience. A young post-war generation, ignorant about exile and intellectual refugees in America and elsewhere, celebrated "foreign"

thinkers, who, however, were their own people prior to 1933. I was fully aware of the ironic situation in which I found myself, at times. Milik Capek, another émigré, and the Philosophical Foundation of Modern Physics were a kind of work that could only have been written by that European generation. Thus, the history of science as well as the philosophy of science emerged as newly developed academic disciplines after the Second World War. Of course, the foundations for these disciplines were laid in the late 19th century, but the accounts as to what sort of scientific activities had taken place throughout the centuries is well known, but no one paid serious attention to them. The letters of Newton and many other savants of the 17th century is a gold mine of information as to scientific projects, experimentation, and conjecture; yet, the passages had to be understood as valuable information on science as science. Mr. Newton would have been amused if someone suggested to him that he is an important person for the academic discipline philosophy of science. He might have responded that there is no real philosophy, nor real science in that field. So what is? These before mentioned disciplines are levels of consciousness of subsequent generations that have only one advantage over Aristotle and Mr. Newton, they lived longer and were able to see the consequences of previous knowledge-seeking activities focusing on science.

I should also mention that I was introduced to American Pragmatism, especially this unique American thinker, Charles S. Peirce. I was fascinated by his rather tragic-comedy biography and his vision of the community of researchers. For some time I didn't understand the significant of Peirce original ideas and, I am afraid, many teachers of science didn't either. But Peirce and American Pragmatism gave me a chance to return to Turkey a second time to introduce their ideas to hungry Turkish graduate philosophy students. The Turkish students were hungry for understanding science, no wonder, considering that the founder of the Turkish Republic, Atatürk, promoted aggressively the scientific enterprise as a project of modernity. I was also in a happy position to discover that John Dewey visited Ankara, the place

I developed a fondness for, and made life long friends. However, I also was fortunate to meet people from the famous theological faculty of Ankara University, known as Ilahiyat, who actually introduced me, hands on, to the basic and traditions of Islam. The so-called "Ilahiyat boys", as I lovingly called them, and their polite acceptance with a sense of humor, became excellent teacher for me and great friends, ever since. The dialogue of civilization started in Ankara long before the word was invented. These famous afternoons, discussion on reason and faith, science and belief, traditions of Islam in various societies in the Near East, were endless. I was a willing student and got better at learning my lessons, from month to month. But, as I still do to this day, twenty years later, I was ready to face the East, but continue thinking west. I have become an interpreter of one religion and culture to another, consciously, without ideology, but in the spirit of respect, learning, and friendship. It was Hayri Kirbasoglu, professor for hadith at the Ilahiyat Fakultesi who introduced me to the finer points of understanding sacred words of Islam, and Alparslan Acikgenc, Dean and professor of philosophy at Fatih University, Istanbul, who introduced me to Dr. Nasr's civilization book and Mulla Sadra. The latter name was totally unknown to me in 1987 and I considered myself relatively well educated by western (even European) standards. Twenty years later I asked my European professional philosophy colleagues, not to mention American friends and colleagues, and they still haven't heard of this great thinker from Safavid Persia.

I was teaching Turkish graduate students about Peirce, Royce and Dewey, while reading Dr. Nasr book with the help of my newly won Turkish friends and colleagues, across the spectrum of Turkish society and politics. Ironically, I was also introduced to the now well known book on *Orientalism* by the late Edward Said. I considered that a discovery but remained distance to the thesis, since I felt, after reading the whole book, that his thesis and project was to ideological underpinned for my taste. More serious, since I know the history of German romanticism and the scholarly activities of German Arabist

well, I didn't understand why Said didn't include them. In the second edition then he did point out his failure not to include them for lack of space. I take it the real reason was that the German scholars would have imploded his more comprehensive theory. I was to meet Said personally several times in Cairo, in the capacity of a philosophy professor, but remained silent about my objections out of politeness. Again, due to ironic circumstances that life brings along, I was suddenly connected to the Iranian sphere of civilization and Islam, and returned to Washington, D.C., where my American-European parents lived. I made a point of introducing myself to Dr. Nasr and wanted to get to know the author who wrote the civilization book. I could not have been more surprised. His generosity, intellectual grasp of centuries of civilization accomplishments, and his patience with beginner s, such as I was in matters of Islamic civilization, especially Persian cultural history, was gratifying. The courses that I attended with Dr. Nasr included the history of Islamic philosophy, Sufism, introduction to Islam, Persian Art and Poetry, and Science and Civilization of the Near East. I started re-reading his civilization book and many more and began slowly to appreciate what was in them. Over the years since, I had the feeling that I was introduced by Dr. Nasr to a comprehensive course on metaphysical presuppositions of civilizations, especially, the Persian-Arabic. In the meantime, over the years, I had the opportunity to test the waters in living experience in Iran and Egypt.

On Science and Wissenschaft

An important aspect in terms of cultural context is the meaning and its application of science, or Wissenschaft, as the German university calls it. The English term science, introduced globally through introductory science textbooks, has a precise meaning, namely, science is reserved for the natural sciences only. Physics, chemistry, biology and many sub-disciplines are considered scientific, but everything else in the Anglo-American curriculum is

excluded. There are the concept social sciences, but I always had the feeling that many English-American-academic speakers don't feel comfortable with those terms since the American Academy feels unsettling using the terms science and applying it to anthropology or sociology, not to mention Gender Studies. The reason is cultural. The uneasiness with which any student of economics, not to mention his teacher, responds to the question whether economics is a serious science, tells me more than just a surprised reaction. Who, except philosophers and the like, would question economics as a science? It is as though the economist feel insulted. The dilemma is, of course, a cultural. Disciplines such as sociology, anthropology, political science, or history have been academic disciplines developed in Europe under certain conditions and presuppositions. Philosophy has always been a part of the equation dealing with the social sciences. This was not the case in the Anglo-American tradition. The over usage of statistics had been, and still is, the benchmark for scientific qualification in many American college textbooks. Psychology is a case in point: comparing academic English language textbooks introducing psychology one gets the feeling that the authors, many times its team work authoring, make a special effort to make all aspects of psychology scientific. Is it a surprise that the most difficult course for psychology majors is statistics, the course, many fail, or have to repeat to be able to continue their psychology studies? Finding Freud in these texts appears like an aberration and embarrassment. Psychoanalysis is not considered serious, not scientific and should not appear in a serious introductory psychology book. Thus the metaphysical presuppositions in a mainstream American social science textbook are everywhere to be found, but never discussed.

I remember well as a graduate student in Bonn University that I took a seminar course with the then well known political science professor Karl-Dietrich Bracher. Bracher was an authority on the history of the Weimar Republic and Nazi Germany. I was interested to find out what he had to say and how these historical episodes in German history play out in his seminar.

However, what irritated me was the term Politikwissenschaft. As an "American undergraduate" I was puzzled why my German student colleagues called politics a Wissenschaft. It certainly didn't mean political science in the American context, since Professor Bracher presented the development of Weimar in a socio-economic and cultural way that was quite foreign to my undergraduate American education. I did ask him about that and he pointed out that I was the only student, so far, who ever asked him the question as to the term Politikwissenschaft. He was acquainted, as visiting professor at Harvard, with the American terminology and its teaching practices and we had a very fruitful exchange. Subsequently in my philosophy Vorlesungen (public lectures) I was introduced to the German historian of philosophy Wilhelm Dilthey by the late professor Wilhelm Perpeet, and began to grasp what Geisteswissenschaft actually entailed.

It is generally said that the German concept of Geisteswissenschaft was a rendering of the English term moral science. Of course, this sounds old fashioned and I wonder if anyone of the present student generation has any notion of what moral science could be. Historically the idea of Wissenschaft per se meant simply a systematized body of knowledge. That, of course, would also mean a methodological study of poetry or society. With the advent of the natural science academic disciplines, especially physics, it became clear in the 19th century that Naturphilosophie of the kind the romantic poets and thinkers like Schelling conceived returned into Naturwissenschaft. Thus, the German idea of a philosophy of nature we find in the poet Novalis, the Danish philosopher Steffens, or the paintings of Casper David Friedrich, quickly was transformed into a scientific treatment of Wissenschaft in terms of quantification and mathematics. This was the Cartesian and Kantian version of nature as mathematical sciences. The enchantment of nature was over and the quantification and methodology was in full swing at German universities and engineering schools. The problem was the humanities, as that body of knowledge is called in Anglo-American institutions of higher learning. A new

problem was faced by Europe's academic elite: after the triumph of the positivist scientific enterprise of the Naturwissenschaften, what is the status to be of the humanities, the Geisteswissenschaften? The humanities are not to be considered science in the sense of exact sciences; yet, they do follow certain kinds of methods, say in anthropology, sociology, and politics, not to mention art history. What were the equivalents scientific methodologies compared to those applied to the study of poetry, for instance? Clearly there was an epistemological problem of the first order; can the objects of the humanities be handled in the same objective manner than a rock to be analyzed chemically and geologically? Rocks and organism are different sorts of items of the universe and must be handled and studies according appropriate methods to them. For Dilthey the basic problem was, picking up a cue from Kant, how can be adequately describe and understand mind (Geist) and its processes in terms of its cultural context? Often the term Kulturwissenschaft is being used. At this point we can see how far we have drifted from the Anglo-American world of a classification of sciences. Needless to say, Dilthey and his followers developed a sort of discipline that we could call metaphysics of presuppositions. Especially in our age of globalization the concept of culture looms large on the horizon of interest. In the English language universe there is a tendency towards thinking in terms of ideology immediately when we talk about culture. In the European context it is understood that there is a subtle difference between ideology and a methodological approach to human structures of understanding object of the cultural sphere. Kant and Marx had sharpened European minds as to the difference. Again, what Marx and neo-Marxists called Űberbau of bourgeois society, i.e., the cultural façade of a capitalist economic system that follows the logic of profit and exploitation was considered part of a scientific approach to a specific kind of societal order. What was needed is to uncover, or better expose, the Unterbau, namely the economic foundations of a society in order to rearrange the order of society in terms of social justice. Again, presuppositions had to be studied and

discovered in order to grasp the empirical reality of the object to be understood.

One of the reasons why psychoanalysis did badly in official institutions of higher learning in Europe's medical schools and in psychology department at American Universities was exactly it status as a science or Wissenschaft. It is no surprise that Freud had problems being promoted to a professorship rather late in his career, aside anti-Semitism, for the reason that psychoanalysis was not recognized by the official medical profession as being scientific, wissenschaftlich. This is still true in many quarters in European institutions. It is, again, no surprise that psychoanalysis and Freud's work had the greatest influence in art, philosophy and even religious studies, if we remember Erich Fromm or Norman Brown. There was a time when some academic intellectuals in American elite colleges celebrated the new discipline of psycho-history. This was a belated reply to Leopold von Ranke's dictum as to the real nature of historical inquiry in a positivist spirit, wie es eigentlich gewesen. This reminds us of the British philosopher-historian-archeologist R.G. Collingwood who elevated the idea of presuppositions onto a respectable informal logic of questions and answers. Collingwood's methodology includes a logical and systematic inquiry into the state of mind of Caesar as he crosses the Rubicon. In order to appreciate that decision we have to research the presuppositions in terms of military strategy, roman politics, geography, even the weather, if possible, in order to arrive at a reasonable logical conclusion as to why and when Caesar made is fateful decision. This is practicing *Geisteswissenschaft* par excellence. It is easy to see why philosophic questions, metaphysical convictions, and historical context are intertwined. I presume one reason why Collingwood never attained the status of an important thinker among mainstream philosophers was that many were spell bound by the rigors of mathematical logic promising philosophy to be turned into a serious science, in the Anglo-American version. The present bankruptcy of philosophy departments in America's elite colleges is a telling story of serious failure in the

face of cultural challenges globally. I doubt seriously whether anyone in China, even since Mao's revolution, would be interested in the logical status of the English sentence, 'the cat is on the mat'. It is an open secret that analytical philosophy, pretending to be scientific, is a failure educationally, especially taught to non-native English speakers in non-Anglo-American institutions of higher learning. Suddenly we see why the idea of Wissenschaft is a culturally understood idea of science. The Anglo-American and French presupposition of science is simply reserved for the natural science and doesn't include the humanities. This situation, no doubt is conditioned by the way the academic disciplined emerged in specific cultural contexts, be it in the United Kingdom, United States, or France. No doubt, Germany and its cultural sphere went a different way and a German student still replies when asked that he or she studies Germanistik, speaks of Literaturwissenschaft. As late as 1986, a well known book by a university teacher of Martin Heidegger was published in its seventh editon entitled Kulturwissenschaft und Naturwissenschaft by Heinrich Rickert. Rickert is less well known in Anglo-American philosophy circles, yet, a very influential thinker in the University of Freiburg promoting the young Heidegger. The exchange of letters between the professor and the young assistant, recently published is telling. It is no surprise that Heidegger, the world famous philosopher, would pronounce to a shocking modern scientific community, "Die Wissenschaft denkt nicht" (science doesn't think). Anyone familiar with the dichotomy between Natur and Geisteswissenschaft and the work of Rickert, would be surprised at all. Clearly in Heidegger we sense the tension between the two spheres of inquiry as to what nature is and what Geist in the Dilthey-Rickert universe is.

From E.A. Burtt to S.H. Nasr

In my professional studies of the work of A.N.Whitehead, especially his *Science and the Modern World*, I discovered an extraordinary work that can't be

classified as a standard history of science, nor a sociology of science, but more of a work in the tradition of Geisteswissenschaft, namely E.A. Burtt's, *The Metaphysical Foundations of Modern Science*, first published in 1924. This pioneering work is a major attempt to come to terms with the philosophic as well as metaphysical presuppositions of the leaders of the scientific revolution in Western Europe, Copernicus, Galileo, Descartes, Gilbert, Boyle and foremost Newton. It is known that Whitehead, while teaching philosophy at Harvard, assigned his students especially Burtt's work and had a great appreciation for the pioneering enterprise of this particular book. As a matter of fact, a careful perusal of Whitehead's *1925 Lowell Lectures* and Burtt's *Foundations* show subtle agreements and analogies. Both thinkers, the philosopher and the mathematician, didn't take anything for granted and hinted at the idea that the scientific enterprise in western civilization, especially the scientific revolution with Newton at the center, was not as value free as some subsequent historians of science have us believe. The presuppositions of the individual men of science, many gifted practicing amateurs, had their heads full of convictions and presuppositions that guided their research and motif scientific inquiry in the first place. Burtt and Whitehead show us how the conceptual framework from ancient to modern science was transformed, based on the metaphysics of a Plato and Aristotle, to be deposed by Descartes's logic and Newton's *Principia Mathematica,* not to mention the Royal Society and its counterparts in Paris and Berlin. Aristotle's *Categories*, headed by substance, quantity and quality, were changed into matter, motion, primary and secondary qualities. Later, Kant was focus on the category of relation instead of substance, by declaring that nature is to be understood in terms of laws of nature described in mathematical formulae. The Ancient worldview was overturned and new metaphysical presuppositions were acquired unassuming, until a few centuries later, a new generation of philosophers and historian uncovered the metaphysical foundations of Newton and members of the Royal Society. Surprisingly to some, religion played an

important factor in the thinking of the makers of the scientific revolution. Newton was full of it. He spent many hours calculating the time of the creation of our planet. Deism was very much in fashion among leading intellectuals of London. The idea was simple: the inquiry and research into the nature of things was equivalent to prayers, doing God's work, in the sense that discovering the wonders and revelation of God's nature. The natural philosopher gentleman could cover himself on two accounts: he could do science without reprimand of church leaders and appear pious to his contemporaries. In the community our science gentleman could assume respectability even though his believe in Deity may not have been as strong as the appearance thereof. The American historian Carl Becker has provided us an ironic picture with a witty book title of *The Heavenly City of the 17th Century Philosophers*. By the time Bishop Richard Bentley asked his friend Newton politely in an exchange of letters as to the harmony between his mechanistic system of the universe and the belief in a creator, Newton, a Unitarian, used Deist arguments. It seems that Bentley was not convinced and most church leaders of the Anglican Church were skeptical, but the tolerant climate of England saved even Newton from public disgrace. It is clear that the work of Burtt, Whitehead, and then Robert K. Merton, not to mention the pioneering work of the Roman Catholic nun Anneliese Meier into the historical context of the Late Latin Middle Ages, were paramount to draw attention to the metaphysical presuppositions in which later claims of the leaders of the scientific as well as political revolution could be disowned. The legitimacy of the modern age owes a great deal, as Hans Blumenberg and others have shown, to the men of the Late Latin Middle Ages, Ockham, Duns Scotus, and lesser luminaries. Special honors must go to Nicolas Cusanus who not only speculated about infinity in mathematical terms, but also ordered the translation of the Quran into Latin, showing great interest in a dialogue with the world of Islam.

Considering the works and descriptions and evaluations of the scientific breakthrough in Western Europe it should be clear that reading the work of Dr. Nasr was an eye opener. Anyone with a European educational background feed on Greek philosophy, the scientific revolution, not to forget the French revolution, and the economics of industrialization, needs to make a special effort to come to terms with the terminology, symbolism and cultural background that manifests itself in Dr. Nasr's work. In a way he did the pioneering work for a western as well as a Muslim reader that Burtt did, at the beginning of the 20th century, for the positivist believer in science. The first impression of Dr. Nasr's work is an intellectual style of Burtt and Blumenberg; the former's factual and elegant style of presentation, the latter's subtle literary and enormously learned cultural banquets, from Goethe's Weimar to Thomas Mann's Lűbeck. In *Science and Civilization Islam* we read clearly, "The spirit of Islam emphasizes, by contrast, the unity of Nature, that unity that is the aim of the cosmological sciences, ... , we see that the idea of unity is not only the basic presupposition of the Islamic arts and sciences: it dominates their expression as well. -Unity itself is alone deserving of representation; since it is not to be represented directly, however, it can only be symbolized- and at that, only by hints." (Nasr, *Science*, 25) These sentences challenge the western reader immediately into responding. The problem is, what does the reader respond to? The reader must first understand not only the words, but also the background and context in which these words are cast. The reader must become an archeologist of metaphysical presupposition. The relationship between humankind, nature and Deity is introduced into the discussion without mentioning these facts, because to a Muslim reader this relationship is as clear as the night sky in the desert, outside of Cairo. For the unity of nature, is the oneness of Deity, is the ultimate unity that gives meaning to the whole. The specialists of modern science, in that sense, are specialists in specific symbolisms that represent nature as unity. This is the reason why depiction is forbidden for the Muslim, since the symbolic and abstract nature of the sacred

art of calligraphy, is precisely the vehicle with which again, that unity is presented. And that unity can't be violated, since it is sacred, and must be treated like a sacred treasure. These are words that may sound somewhat curious to the western intellectual since he is used to a different sort of vocabulary that is applied in a different setting with different metaphysical presuppositions. Dr. Nasr is aware of this and tries, at times, to soften the impact of strangeness to the western reader. Yet, this work does a great service in a twofold way; first, it opens up a whole new world (certainly at the time of its publication in 1968) for the western reader and perhaps for the Muslim, who may have not be aware of the enormous richness of Islamic civilization in terms of science, education, philosophy, and its various cultural tradition, second, from a research point of view and cultural perspective, it gives the reader for the first time a comprehensive Weltanschauung of the scientific enterprise in the Islamic world that was basically denied by the West for many centuries.

Here is testimony that science in the Islamic world, from Andalusia to Persia, was a novel and creative enterprise conducted by first class minds and transmitted to the Latin Middle Ages, largely unacknowledged until the 20th century. Dr. Nasr shows that European educational institutions must make a great effort to acquaint subsequent generations, in the process of globalization, with the scientific achievements of Muslim men and women and their respective contribution to world knowledge throughout the centuries. To inquiry into the metaphysical presuppositions will take a longer time and more professional preparation since many documents and manuscripts, bearing testimony to intellectual activity in the Islamic world, have not been edited or made available to the public. We are at the beginning of this process and the first step in the right direction was made by Burtt, Whitehead, and not the least S.H. Nasr.

The Modern Science Debate: Max Weber, Thomas S. Kuhn and Karl Popper

Probably the most important debate on the nature of modern science took place between Karl Popper, the exiled Austrian philosopher of science and former professor at London School of Economics, and Thomas S. Kuhn, the American MIT professor of the history of science during the later half of the 20th century. I remember as an undergraduate in 1968 that I heard of Kuhn and Popper. Kuhn was somewhat known among the philosophy students as the author on Copernicus and the scientific revolution and slowly we got to read his epoch-making *The Structure of Scientific Revolutions*, originally published in 1962, in the series edited by Otto Neurath and Rudolf Carnap called International Encyclopedia of Unified Science. Many of us had no idea of the European background of the ideas found in Kuhn and the programmatic science philosophy for which Carnap and Neurath stood. Everyone in the Anglo-American world started to know Wittgenstein as a curiosity from Austria at Trinity College, Cambridge. The cultural background of Wittgenstein, Carnap, Feigl, Tarski, or Reichenbach no one knows or was interested in.

Only after Stephen Toulmin published the book *Wittgenstein's Vienna* the cultural context in which the so-called Vienna Circle emerged a profile. The central European literati and mandarins know Karl Kraus and his sharp Viennese tongue as well as the Café culture of Vienna. Yet, there was no real interest in the positivist kind of philosophy the Vienna circle proposed in German speaking university, especially philosophy seminars. The success and enormous intellectual impact of the Vienna circle happened in the American exile. Especially in the post-war period and the 1950s did the positivist attitude, with the emphasis on mathematical logic, gain ground in American colleges and philosophy departments. In conjunction with the emerging analytical mode of thinking, imported from Oxford by the American student John Searle did the British philosopher J.L. Austin, gain a following. The idea

was clear: to turn philosophy into a respectable discipline and scientific. Get rid of philosophy's old style baggage like the history of philosophy, Hegel and the like, since they wrote nonsense most of the time. This was the general attitude at the time.

The respectable American philosopher Morton White published an important book of basic writings of 20th century philosopher entitled *The Age of Analysis* originally in 1955. It turned out to be my very first professional philosophy book in a new edition during my freshman year at he newly established Cragmor Campus of the University of Colorado. The selections included Peirce, Russell, Wittgenstein, Dewey, but also Bergson, Croce, Sartre and Santayana. I was fortunate to be introduced to professional philosophy by my first teacher the late professor Eldon L. Stevens, who, however, was a fan of the Danish theologically oriented philosopher Sőren Kierkegaard. Dr. Stevens, a teacher and thinker of subtle intelligence and delightful sense of humor, unknown to me at the time, saved me from the scientific oriented professional in philosophy. Kierkegaard was my real first western thinker I encountered in earnest and served his purpose ever sense. However, White starts the first chapter (with the title "The Decline and Fall of the Absolute") of this important book with this statement, very typical of the attitude in the late 1950s towards German idealism and metaphysics, at large: "It is a remarkable tribute to an enormously muddled but brilliant German professor of the nineteenth century that almost every important philosophical movement of the twentieth century begins with an attack on his views." (White, 1964,13) The assessment, in hindsight, is correct considering that the first book by Karl Popper that made headlines in America's intellectual circle was his *Open Society and its Enemies* (1945), written in his New Zealand exile, as a response to the Nazi catastrophe for European society and culture. Popper's critique of Plato and Hegel as the archenemies of an open and democratic society caused much controversy in the Geisteswissenschaftliche seminars of central European universities and Cafés in the 1950 and well into the mid-1960s. In reality the

book was a proxy struggle between two camps of philosophic *Weltanschauungen*, the idealist-dialectic method of philosophy inspired by Hegel and promulgated in a scientific materialism of Marxism, and the clear cut view of *Naturwissenschaft* to turn philosophy into a science, with logic at the center. In terms of politics it was a struggle between a Marxian view of history as against a liberal capitalist system of free trade and individualism. In terms of cultural geography it was a confrontation between the free-wheeling Austria-Hungarian Empire and its capital Vienna, and the modernist socialism of Berlin, as well as the provincial German university towns such as Heidelberg, represented by Max Weber, Jena represented by Hegel and the romantic circle around Novalis, and, not the least, Freiburg, the philosophy seminar of Edmund Husserl and his assistant Martin Heidegger. These cultural clashes (better *Auseinandersetzungen* in German) are still with us in the early 21st century fought by groups with a more international or global reach, but having their roots in the old Europe. Henry Kissinger, Leo Strauss, Hannah Arndt, Theodor Adorno, Alfred Schűtz, are a segment of the intellectual heritage of Europe in America. The younger generation continues these clashes, often, unknown to them that they fight old cultural battles worked out in the university town and capitals of the old Europe.

T.S. Kuhn's work is a curious blend of American history of science and European sociology of knowledge. He acknowledges the influence of Alexandre Koyre, a Russian émigré who was once a student of the father of phenomenology Edmund Husserl in Gőttingen, before Husserl attained the professorship in Freiburg. These biographical details are important to know since it enables us to trace the intellectual pedigree of Kuhn's innovative ideas that turned the tables on the Vienna circle. The pioneering work of Anneliese Meier is mentioned, as well as Arthur O. Lovejoy's classic *Great Chain of Being,* that was required reading for any student of the history of ideas. In terms of developmental psychology Kuhn mentions Jean Piaget, whose influence reached even American teachers' seminars in the 1960s and 70s, as well as the

Gestaltpsychologists Marx Wertheimer and Wolfgang Kőhler. Especially the latter turned out to be an successful exiled professor of psychology in Swarthmore College and a friend of Whitehead at Harvard, at the time. Again, these details are important because it shows that psychology conducted in a scientific attitude had a far better chance of academic success in positivist oriented America of the 1950s than its sister psychoanalysis whose practitioners had to make a living putting mid-life crisis gentlemen, and neurotic housewives, as well as the more eccentric segment of New York society on the couch. It is no accident that Woody Allen turned out to be the icon of New York intellectuals and the more critique oriented youth of 1968 and beyond. Kuhn also gives us the name of Benjamin L. Whorf, the businessman, self-styled original linguist, who taught us how language itself represents a Weltanschauung of its respective culture. This was a philosophy of language prior to Chomsky's generative grammar project. I had the good fortune of being in the linguist seminar of Professor Helmut Gipper at Bonn, who had written a respectable work on Whorf and substantiated his finding in his field study to the Hopi Indians in Arizona. Knowing these thinkers from various fields made me understood Kuhn much better in addition to the philosophic heritage of Dilthey and the hermeneutic school. The logican Quine had some influence on Kuhn in that the latter made the former more sensitive and aware of the distinction between analytic and synthetic sentences and logical structure generally. The original work by the Viennese thinker Ludwig Fleck on the development scientific fact published in 1935 makes it clear that Kuhn paid attention on his European trip with Koyre. Underneath of this biographical pedigree research looms large Max Weber. Although Weber is not mentioned by name, his influence on the problems of scientific activity and its socio-economic condition within the respective religious context of a society is part of the invisible equation. The basic tenets of Kuhn's thesis and Popper's idea of the logic of scientific discovery is too well known to be repeated here and wasting space. Yet, the metaphysical

presuppositions of a culture in terms of its science, art, religion, and philosophy must unravel again, in a global perspective. This takes a revisiting to old sites and haunts, sometimes happy memories reappear or periods of defeat, ignorance, and prejudice. But the idea of a comprehensive analysis and understanding of the basic conditions that make a science, especially modern, possible, not to mention modern art, or modern philosophy, is inescapable. To speak of course of a modern religion may sound to some ears blasphemy or a bad joke; but let us be honest, the old time religiosity and its symbolism will be transformed a new, technologically feasible, symbolic system that the younger generations prehend. No doubt, the principles will remain, as long as humankind feels a need of transcendence.

Conclusion

The present essay may not have turned out to be conventional. The idea was not to follow mainstream article writing and bore and take away valuable time from busy schedules. I have tried to show in terms of my own experience, living in different countries with very different cultural outlooks, in Europe, America, and the Near East, and even the South-Eastern part of the globe, that metaphysical presuppositions are real and not imaginations of clever written books. Facts, structures, functions, and conditions are important to consider, but the psychological aspects of the metaphysical undertone should not be underestimated. Human beings are not exclusively rational, despite my admiration for Weber and rationalists; people are closer to Freud than they would like to admit, but many choose, out of a metaphysical necessity to face in the direction of transcendence. In that sense Dr. Nasr has done a great service to all who are still love with logos, but not sure, whether that's enough at the end.

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