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Postmodernism: Transition from the Newtonian to the Quantum Paradigm Augustine Pamplany

Abstract: The praxis of modern culture, including its life styles, values, metaphors, languages, myths, etc. have been almost imperialistically generated and dominated by science. The scientific culture is universal because, as Peacocke has rightly judged, “today one of the universal languages of humanity cutting across all cultural boundaries is that of science” (1989:11). This dialectical mutuality between science and culture has been a historical reality over the centuries, and this indissoluble link between the two is what has brought science and scientific issues on to the platform of the postmodern debates. No wonder the polyvalence of the concept of modernity has been so over-encompassing.

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Postmodernism

Transition from the Newtonian to the Relativistic-Quantum Paradigm

Augustine Pamplany

Little Flower Study House, Aluva, Kerala

The praxis of modern culture, including its life styles, values, metaphors, languages, myths, etc. have been almost imperialistically generated and dominated by science. The scientific culture is universal because, as Peacocke has rightly judged, "today one of the universal languages of humanity cutting across all cultural boundaries is that of science" (1989:11). This dialectical mutuality between science and culture has been a historical reality over the centuries, and this indissoluble link between the two is what has brought science and scientific issues on to the platform of the postmodern debates. No wonder the polyvalence of the concept of modernity has been so over-encompassing:

It (Modernity) is the name given to a series of spectacular transformations of life that are the very stuff of any interpretation of our contemporary situation: from feudal economic systems, to free-market, industrialized economies; from political power, concentrated in the hands of a few, to vast democratic institutions that encourage wide distribution of information and

responsibility; from natural science as primarily classification and description, to an internationally coordinated quest for progressive, experimentally supported theories that enable prediction and control; from candles and ox-drawn plows, to a panoply of technological marvels that have transformed the average standard of living and the way we relate to the world around us; from widespread superstition and credulity that lent itself to exploitation by a few and preserved ignorance of social and psychological realities, to an equally wide-spread spirit of criticism that has given birth to free speech and the free press, to social and political institutions with a rudimentary capacity to criticize and correct themselves, and to the systematic study of human psychology, religion and social life (Wildman 1996: 43).

The transition of modernity in its manifold dimensions to postmodernity is effected by a series of factors. Science has played a crucial role in this transition. There has been substantive interaction between the postmodern cultural and intellectual transition and the transition in the scientific scenario. The

* Augustine Pamplany is the Dean of Philosophy at Little Flower Study House, Aluva. He may be contacted at <lfsipr@satyam.net.in>.

move from modernism to postmodernism, scientifically understood, is a move from the classical or Newtonian worldview to the relativistic-quantum worldview. Nevertheless, there exists a number of conceptual commonalities between the postmodern tenets and the emergent scientific perspectives. My concern in this paper is to highlight these commonalities of perspectives from ontological, epistemological and anthropological points of view and to show the divergent roles played by modern sciences in effecting the transition from modernity to post modernity.

1. Modernity` - The Epistemic, Anthropic and Ontological Assumptions

The Scientific paradigm that dominated and in some way controlled the conceptual foundations of the social, religious, cultural and philosophical currents of modernity was the classical paradigm founded on Newtonian mechanics, which was corroborated by logical positivism in the 20th century. In the history of science, the 17th and 19th centuries witnessed the unprecedented triumph of Newtonian mechanics. Newtonian mechanics was based on the idea that the universe works like a huge machine according to some fundamental laws of nature. Determinism was the immediate consequence of this outlook. The universe is viewed as a great clock set in motion. The future of the universe is already determined by the past; which as finite beings we cannot know, but which is known by the divine mind. In a way, eternity has already happened. We are mere spectators of an eternally

pre-determined cosmic drama. It was a world-view, which arose due to the development of science, mainly the science of mechanics, chemistry and medicine. It arose as an attempt to eliminate from science all unobservable elements like substantial form, vital force, etc.

According to the Newtonian view, all phenomena of our experience can be explained in terms of matter in motion and interaction between parts of matter. In other words, the laws of mechanics can explain everything. It claims that all phenomena of our experience can be accounted for in terms of four fundamental elements, namely, mass, force, space and time. The laws of mechanics are universal. They can explain even biological phenomena. Chance and contingency have no place in science. This view has led to physical reductionism, which means reducing biological organisms to machines, and thereby reducing biology to physics and chemistry.

Epistemologically, mathematical formalism is emphasized. Laws of mechanics are expressed in terms of mathematics and everything can be explained in terms of mathematics. Due to the stress on mathematics, absolute accuracy and certainty began to be emphasized. Absolute objectivity is thought to be possible. Subjectivity has no place in science. Despite the fact that Newton, Galileo and Kepler were strong believers, the end of this theory was atheism. Spirit and spiritual beings have no place here. The matter spirit distinction got blurred. Intelligence is no more a quality of the soul, but of sophisticated complex matter. The consciousness and spirituality of the humans are explained

as the reflective properties of sophisticated matter.

The logical positivists were reacting against the intrusion of metaphysics into science. To demonstrate the meaninglessness of metaphysics was their goal. Logical positivism went to the extreme of claiming that any knowledge that is not based on experience is invalid. Any valid statement must have an empirical basis. Science according to them is a set of laws, theories, concepts, etc. Scientific knowledge is governed by strict rules of rationality. Non-scientific factors like prejudices, upbringing, status of a scientist, etc. have nothing to do with science. Scientific knowledge is totally objective. Science is valid for all places, persons and times. Logical Positivists advocated the verification theory of meaning. It says that a statement is meaningful only if it is empirically verifiable. A contingent proposition is meaningful only if there is an empirical method for deciding whether it is true or false.

Ontological determinism gave rise to methodological reductionism and scientific absolutism. An explanation of the mysteries of a human being needed nothing more than a few neurological and psychological traits. This scientific absolutism was distasteful to religion. Religions, especially monotheistic religions, in defence of their metaphysical presuppositions, became the major opponents of science. The split and antagonism between science and religion is the natural consequence of the deterministic world-view adopted at the beginning of the modern era:

Our modern western civilization began with a kind of cultural schizophrenia. Our scientific enterprise effectively decoupled itself from our humanistic-spiritual traditions at the beginning of the modern period. All for good reasons, yes, but now the neurosis spreads over several continents. Enmeshed in the most terrifying pathology in the history of humanity, we can perhaps dare to ask if this was such a good idea, this splitting of the universe (Swimme 1985: 17).

Another theoretical consequence of the reductionistic and mechanistic worldview was the “disenchantment and desacralization of the world” (Arakkal 1988: 47). There are many religions, which attribute a certain amount of divinity to material realities like the earth, the sky, the sun, rivers, stones, mountains, etc. The mechanistic understanding of the world makes no room for such an approach. A profound dedivinization of the world and a disenchantment of nature and natural powers are the outcome. Though the mechanistic worldview had been a decisive step towards our technological and scientific enhancement, it has to be considered a mixed blessing in regard to the dedivinization of the world.

Anthropologically, an extreme formulation of the spirit-matter dualism to be found in the seventeenth century philosophy of René Descartes also accompanied the birth of modernism. Descartes’ famous sentence *Cogito, ergo sum* - I think, therefore I exist - has led Westerners to equate their identity with their mind, not with their whole being. When humans understand themselves as mere aggregates of parts, it will

reflect in their view of the world as a multitude of separate objects and events:

The belief that all these fragments - in ourselves, in our environment, and in our society - are really separate can be seen as the essential reason for the present series of social, ecological, and cultural crises. It has alienated us from nature and from our fellow human beings. It has brought a grossly unjust distribution of natural resources, creating economic and political disorder, an ever-rising wave of violence, both spontaneous and institutionalised, and an ugly, polluted environment in which life has become physically and mentally unhealthy (Capra 1984: 9).

Mechanism, reductionism, anthropocentrism, determinism, objectivity, certainty, absolutism, etc. are the central pillars of the modernity. These perspectives have broken the awareness of a universal harmony between God, humans and the rest of the creation. Isolation, privatisation, objectification etc., were the result of this alienated state of affairs. A total fragmentation of Reality into subject and object, into humans and the world, etc., were the necessary consequences.

Scientific and technological developments have led to a denial of the "mystery" of the universe. Science claimed to be able to interpret everything in terms of objective and rational knowledge. Humanity hoped to reach the zenith of everything on the wings of science. A universal scientific culture which resulted in the termination of all divergent and local natural values was the immediate result of it. Unfortunately, when the polar ends came closer

on the wings of science, hearts were flying away. Humanity was thrown away from the noble cosmic hearts of solidarity, unity and harmony.

The technological age marked a total flight of humanity from the bosom of Mother Earth. The radical dualism between heaven and earth and loyalty to rationalism and science are some of the characteristic features of the value system of this stage. "We switched our worship from the heavenly Father to this worldly science, from the veneration of religious saints to the almost religious belief in the capacity of our scientific saints to understand and control our world. And, consistent with Epoch II values, the prodigal son's theology was "3 M" - masculinity, materialism and machines" (Keck 1993: 219).

This ambivalence brought out mostly by the sciences leads us to think along with Wesley J. Wildman that the "root cause of the problematic character of modern western culture is a profound confusion, a schizophrenic uncertainty, about how to *be* in the world" (Wildman 1996: 44). This schizophrenic tension is manifested in the economic, political and religious life of the contemporary West. The economic practices of the free-market economy undermining the moral and natural resources necessary for its own continuation, the failure of the western democratic political institutions to give leadership to their constituents such as family, education, etc. are remnants of the chasm within modern culture.

Most of us in the West no longer confuse between myth and history, but neither do we know how to

reappropriate our demythologised stories. We seem to know a great deal about how we human beings and the world work, but we are often at a loss to know how to affirm meaning for our existence in that supposedly “well understood” world, unless it is by means of regression to that *naïveté* so seductively packaged in religious fundamentalism and political fanaticism of the right and the left (Wildman 1996: 44).

2. Postmodernity – The Post-Newtonian Scientific Paradigm

The triumph of modernity coupled with the onslaught of the scientific culture was powerful and pervasive. But it was too one-sided to last forever. Hence, the crucial question raised in the middle of the 20th century was “whether this Western cultural prodigal will return home” (Wildman 1996: 44). An ancient Chinese proverb says that the *yang* - one of the two polar opposites in the cyclic motion of the Tao - having reached its climax retreats in fervour of the other, *yin*. If the classical ideals of objectivity, determinism, reductionism, etc. resulted in the plight of modernity, the self-critical spirit of modernity as manifested in the postmodern strategy of the human quest for understanding has retrieved the opposite direction showing an unprecedented level of unification and defragmentation. The Relativistic Quantum paradigm often termed as the new physics has radically altered the very frameworks of our ontological, epistemological, anthropological and theological thinking. The divergent tenets of postmodernism are equally paralleled by a scientific phenomenon that it is often difficult to distinguish between the two.

2.1 The Unifying Ontology

Classical physics believed that every reality in the world is made up of some material stuff. It always associated the mass of an object with some material substance. This belief in some “basic building blocks” of the universe was completely shattered by Einstein’s theory of relativity. Einstein’s strong faith in the inherent harmony of the universe is manifest in his theory of relativity, which showed that the mass of an object has nothing to do with any substance. Mass of an object is nothing but a form of energy. It means that a particle can no longer be seen as a static object, but rather as a dynamic pattern. Since every object in the world is understood as a pattern of energy, in relativity theory the whole universe appears as a dynamic web of inseparable patterns (Capra 1984: 186-188).

According to the classical understanding, the universe consisted of solid objects. In Newton’s own words: “It seems to me that God in the beginning formed matter in solid, massy, hard, impenetrable movable particles, of such sizes and figures, and with such other properties, and in such proportion to space, as most conducive to the end for which he formed them; and these primitive particles being solids, are incomparably harder than any porous bodies compounded of them” (Crosland 1971: 76).

Max Planck’s discoveries regarding heat radiation was a turning point in the development of modern physics. Max Planck discovered that the energy of heat is emitted not continuously, but as energy packets.

This led to the discovery of the probability waves in quantum physics. According to Heisenberg: “The probability wave... means a tendency for something. It is a quantitative version of the old concept of *potentia* in Aristotle’s philosophy. It introduces something standing in the middle between the idea of an event and the actual event, a strange kind of physical reality just in the middle between possibility and reality” (Quoted in Herbert 1987: 27). The discovery of the probability waves in quantum mechanics totally destroyed the classical concepts of solid objects. The new discovery showed that the solid objects of classical physics were to be understood as wave-like patterns of probabilities. The developments in particle physics further revealed that the probability waves actually represent the probabilities of interconnections. The subatomic particles get meaning only when they are understood as interconnections.

Quantum theory has thus wiped out the theory of determinism. Classical mechanics with its deterministic view of the entire material creation moving in a way that can be predicted with absolute accuracy left no room to chance. The ideas of probability, uncertainty, randomness, etc. which are so fundamental to quantum theory are in sharp contrast with determinism. Heisenberg takes a tough stand against any kind of a deterministic understanding of quantum theory. “The hope that new experiments will lead us back to objective events in time and space is about as well founded as the hope of discovering the end of the world in the

unexplored regions of the Antarctic” (Quoted in Herbert 1987: 17).

The reductionism, mechanism and determinism which provided the ontological foundations for the classical worldview have now retreated in favour of a more organic and indeterministic vision of reality. The shift from modernism to postmodernism is thus paralleled by this paradigmatic shift on the scientific scenario.

2.2 The Epistemological Transition

Postmodernism is born out of modernism. The natural science of today can no longer be called ‘modern.’ It is in the process of becoming postmodern science. Epistemological uncertainty as opposed to certainty, existential insecurity instead of the modern promise of security, ontological contingency against the modern necessity, the ethical paradoxes and the relativization of the absolute characterise postmodern philosophy, science, religion, literature and so forth (Puthenpurackel 1999: 5).

The theory of relativity, the quantum theory and chaos theory which constitutes the new physics point to the parting ways with the classical or Newtonian physics. The new physics and postmodernity enrich each other. Modernity argued for the truth existing independently of beliefs, concepts and human intelligence. Postmodernists do not agree with the objective character of truth. There is a plurality of belief systems. Postmodernists argue that there is no foundation to secure a universal and objective reality. “Postmodern

thought is characterized by a loss of belief in an objective world and incredulity towards meta-narratives of legitimation” (Kavle 1995: 19).

Postmodernism means:

a doubt that any human truth is a simple objective representation of reality. A focus on the way societies use language to construct their own realities. A preference for the local and specific over the universal and abstract. A renewed interest in narrative and story-telling. Acceptance that different descriptions of reality can't always be measured against one another in any final, i.e., objective and non-human-way. A willingness to accept things as they are on the surface rather than to search (Kavle 1995: 18).

2.3 Loss of Belief in Objective World

Two significant features of postmodernism, as described by the American critic Fredric Jameson, are 'pastiche' and schizophrenia (Sarup 1998: 146). By pastiche is meant that there are no longer innovations but only a rediscovery of something that preexisted. This is a practice of style, the imitation of dead styles so that we become unable to focus on the present (time). And we have a tendency to look at ourselves historically. "Postmodernity seeks to leave alterity as its destiny and not to be the source of alterity in so far as postmodernity chooses not to produce the differentiated or disseminated other" (Calcagno 1997: 819). Postmodern philosophy typically opposes foundationalism, essentialism and realism. In short, it is said that postmodern philosophy is a kind of negation of all sorts of established

thought, valued and preserved until the middle of the last century.

Postmodern philosophy is usually regarded as a complex structure of concepts which include an anti-essentialism; anti-epistemological standpoint; anti-realism; anti-foundationalism; opposition to transcendental arguments and a transcendental standpoint; rejection of the idea that knowledge is accurate representation; rejection of truth as correspondence to reality;...rejection of principles, distinctions, and categories that are thought to be unconditionally binding for all times, persons, and places; and suspicion of metanarratives of the sort perhaps best illustrated by dialectical materialism... it also rejects the traditional dream of a complete, unique and closed explanatory system typically fueled by binary oppositions (Audi 1995: 634).

Post modernists generally reject foundationalism, which is in quest of an absolutely clear and certain foundation of knowledge. Thus, the very central ideas of the Cartesian vision are turned down. Epistemological certainty, logical validity and metaphysical necessity are questioned. It is claimed that there is no universal truth that is valid for all. Anti-foundationalism leads to relativization in the sense that the meaning and truth of our judgment are relative to certain convention or local experience (Charlesworth 1976: 194).

A parallel to the postmodern shift in the epistemological paradigm is found in the emphasis laid by philosophers of science on the uncertainty and subjective dimension of the scientific

knowledge. The uncertainty or indeterminacy principle expounded by Werner Heisenberg constitutes the most central principle of the quantum theory.

This principle says that it is impossible to determine exactly both the position and momentum of a particle at the same time. No matter how we try, no matter how sophisticated the instruments we use, there will be a certain amount of uncertainty. Thus, uncertainty principle puts a natural limit to precise measurement of atomic particles on theoretical grounds. If we try to know the position with complete accuracy, then the momentum or velocity escapes us completely. Thus, the uncertainty principle arises not simply due to the disturbance on the event by measurement but as an actual property of physical events. In other words, the nature of reality is such that we cannot have precise knowledge of the velocity and position at the same time. It means that the clear-cut particle of classical physics no longer represents the real state, but only the idealised state. The uncertainty principle restricts the scope of our knowledge of the ultimate structure of reality. The absolute certainty of classical physics is absolutely under scrutiny here.

The subatomic world is a world of puzzles, paradoxes and perplexities. Chaos, randomness and probabilities rule the subatomic world. The subatomic units of matter are abstract entities which have a dual aspect. Depending on how we look at them, they appear sometimes as particles and sometimes as waves. This is a very strange property of matter. A particle is confined to a very small volume. But a wave is

spread over a large region of space. It was the observation of this paradox that finally led to the discovery of the new quantum theory. The contradiction between particles and waves was solved as the physicists realized that subatomic entities are merely “tendencies to exist,” and atomic events do not occur with certainty at definite times and definite ways, but rather shows “tendencies to occur” (Capra 1984: 39). This means that unlike our ordinary experience, matter at the subatomic level is only a quasi-reality. Quantum physics brought in a new vision of matter. Matter itself is not purely material in quantum physics. It was here the scientists felt that they were slowly losing their grip on reality.

Again, the laws of atomic physics are expressed in terms of probabilities. Probability means we can never predict an atomic event with certainty; but we can only say how likely it is to happen. This is because subatomic events do not occur with certainty. They occur at random. The certainty of the macroscopic world is reduced to uncertainty in the microscopic world.

The subject-object distinction of the macroscopic world does not exist clearly in the microscopic world. This is evident from the experiences of the physicists in the microscopic world. Herbert’s imagination beautifully conveys this idea:

Suppose, the famous quantum physicist Max Born, decides on Monday morning to face the quantum facts. Putting on quantum-resistant body armor, he climbs inside his bubble chamber, waves goodbye to the work-

a-day world, and prepares to enter the mysterious realm of the quantum world. Suddenly he drops through the world's phenomenal surface into deep quantum reality. Holy Heisenberg! Centuries of Newtonian certainties vanish in an instant. Solid objects melt into the undivided wholeness as he enters the place without preparation. Max's subject-object membrane dissolves. He mixes with the mystery. In tune with totality he feels he is in a new universe and that universe is he himself (Herbert 1987:55-56).

Mass, force, space and time were the fundamental pillars of Newtonian Physics. However, the new physics challenges this by reducing force to field, mass to energy, and solid atoms into subatomic particles. Here we have the postmodern traces of blurring and transcending boundaries.

The recent insights into the nature of science and scientific knowledge as highlighted by the historicists and historical realists also are analogically in tune with the postmodern traits of knowledge. Historicists emphasized the history of science. Historicism arose mainly as a reaction against logical positivism. The historicists looked at science as it is, whereas the logical positivists looked at science as it should be. Their main aim was to demythologize the logical positivist understanding of science. Historicists were of the opinion that there are also non-rational elements in science as opposed to the logical positivists' mythical claims of the absolute rationality of science. For historicists science is a mixture of rational and irrational elements. The logical positivists' belief that science has a unique claim to truth is proved to be mythical. Science

is just one among many other disciplines. According to the historicists nothing in science is permanent. Meaning, criteria, theories, methods and laws change.

The unique contribution of the historicists to scientific epistemology, critically understood, is their emphasis on the *Weltanschauung*. *Weltanschauung* or world-view is a collection of factors like background, training, passions, bias, prejudices, etc. of the scientist. The worldview of the scientist plays a crucial role in science. The worldview colours and controls the world of the scientist. Philosophy of science is meant to identify this worldview.

The relativistic-quantum paradigm of the new physics has parted ways with the epistemological assumptions of Newtonian physics and logical positivism, the hallmarks of modernism. Of course, science cannot stand apart from the mainstream cultural evolution, rather it has to pave the way for emerging cultures.

2.3 The Anthropological Transition

Where modern anthropologists advocated a mechanistic and dualistic vision of the human being, the postmodern anthropologists aim at a world in which all realities, cultures, worldviews, symbols, etc, flow together. In the words of Richard Shweder, "There is no single best place to be raised, but one of the really good places to be raised is any place where you learn that there is no single best place to be raised. I call that place postmodern humanism" (1995: 74). It is an era of hu-

manism where the inside (native) is out and the outside (foreign) is in. Its humanism is a universalism without uniformity, which challenges us to do several apparently contradictory things (Shweder 1995: 68). The unity of human beings is no longer to be found in something which makes us the same but in a universal original multiplicity which makes us so variegated that others become accessible and imaginable to us through some aspect of our own self (Shweder 1995: 74).

Hence, the scope of our generalization is restricted to local cultural worlds. It implies the transcending of the human spirit across divisions in cultural milieu and an appreciation of the value of alien things. The new humanism acknowledges the intrinsic worth of each infinitesimal particle. Balancing multiplicity with due recognition of individuality is characteristic of postmodernism. Modernity's concept of self as occupying the top rung of the ladder of reality has been relativised by postmodern thinkers (Anderson 1995: 123). The human is put back as one among the other realities. For postmodernity there is no true self. "What is named as self is merely momentary reflection of bodily states and environment; some say this is proving to be a sense of identity based on a reality of immersed interdependence in which it is a relationship that constitutes the self" (Anderson 1995: 123). This marks the end of individualism. Postmodernity avoids the dichotomy of the other by regarding the other not as opposed to but as constitutive of the self.

Today in the scientific context, human being is no more the measure of

all things. In the light of the new physics, a proper understanding of humans extends far beyond the cosmos to the consciousness of humans. Humans and the cosmos seem to join hands on the ground of reality in the bosom of the natural sciences.

The human observer, in atomic physics, is an essential part of the definition of the properties of subatomic phenomena. The scientists, in atomic physics, can no more play the role of a detached observer. Contemporary physicist John Wheeler, therefore, suggested replacing the word observer by the word participator in science:

Nothing is more important about the quantum principle than this, that it destroys the concept of the world as "sitting out there," with the observer safely separated from it by a 20-centimetre slab of plate glass.... To describe what has happened, one has to cross out that old word "observer" and put in its place the new word "participator." In some strange sense, the universe is a participatory universe (Wheeler and Mehra: 244; Quoted in Capra 1984: 127-128). Now in the postmodern scientific age we need to transcend our own egos. "So, from domination and pinnacle status we are now beginning to see ourselves as participants in an incredibly interrelated, marvellously synergetic, ecological matrix - a point of view that emphasizes relationship, responsibility, community, communion, and a common destiny" (Keck 1993: 226).

Copernicus threw us away from an illusory royal position at the centre of the universe. Galileo kept us aside as a mere spectator in the cosmos. Classical physics reduced us to a pure physical

mechanism existing in itself. However, postmodernity and postmodern sciences have given us a glimpse at the polyvalence of the human mystery. Einstein sums it up well: “A human being is part of the whole called by us ‘Universe’; a part limited in time and space. He experiences himself, his thoughts and feelings as something separated from the rest – a kind of optical delusion of his consciousness. . . . Our task must be to free ourselves from this prison by widening our circle of compassion to embrace all living creatures and the whole of nature in its beauty” (quoted in Herbert 1987: 250).¹

The ontological, epistemological and anthropological transitions in the postmodern intellectual milieu place the human critical spirit on a rich productive soil. The question here is not so much whether postmodernity has brought the prodigal back home, but how much postmodern humans can be at home in their newly discovered home. A well authenticated praxis of postmodernity evident in a penetrating reassessment of the perennial foundations of our social, religious and political life may reinforce our optimism about the future of the postmodernism.

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