A Rereading of Scientific Objectivity. Scientific Truth as Subjectivity

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The problematic on the resistance to what is considered subjective or subjectivity in man's intellectual concerns exhibits one of the longest enduring issues there is in the history of his ideas. Subjectivity in this anterior sense was taken to identify itself with the primacy and autonomy of man's individualism which filters thinking and the ideas which he succeeds conjuring. On its extreme forms, subjectivity assumes the position of "sedimented" categories which filters every incoming datum from the outside world according to a personally constituted criteria. Thus the coinage of the term sedimentation. This article essays the proposition that truth, and scientific truth no less which is grounded on a scientific objectivity, starts with what is considered subjective in its broader forms. Not all subjectivities however are 'created' equal. Some of them are more equal than the rest. Not all biases and prejudices as sedimentations are obstacles to scientific truth. Some are useful and indeed necessary. The canonical referent in science is a product of a processed subjectivities of the scientific enterprise, the summation of which we call scientific objectivity.

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We take objectivity in its epistemological sense, in the sense which Paul Ricoeur (1992:21) describes as "what thought has worked out, put into order, understood, and what it can thus make understood."

Our proposition further affirms that the appropriate reconstruction and analysis of autobiographicals of canonical referent writers which are evidently primary sources of philosophy of science are replete with subjectivities but which have been meaningfully processed towards a postmodernist scientific objectivity which we now access as canonically referential.

I. Correspondence as Objectivity

Tradition considers truth as essentially a correspondence or conformity of sorts. It is either an affirmation or a negation between what we say is the truth and the basis as evidence of what we say. In science, the agreement between the meaning of the statement as an affirmation/negation with its basis such as an experiment which leads to the public proclamation of a canonical referent requires the corresponding affirmation/negation of the community, e.g., the community of scientists. The truth-status of the referent then assumes confirmation and signals acceptance as canonical in a wider parameter not only by scientists, but by society at large. This is evidenced by an increasing interest in multidisciplinary areas what has come to be accepted as the sociolcgy, politics, or the economics of science and its research programs.

There is a striking similarity between the classical historiography of truth and the seminal culture of avoidance and detour, characteristic of the received epistemological physiognomy of science. This is the severance and the assundering of the genetic thinking process from the definitional and sentential stage. This is evident in scientific constructs as it is obvious in the traditional definition of truth. Werner Heisenberg (1962:51) observes, "This partition has penetrated deeply into the human mind during the three centuries following Descartes and it will take a long time for it to be replaced by a really different attitude toward the problem of reality." He is not so much worried about the predictability borne out of a mathematical framework installed by the Cartesian anxiety as much as he is worried about being "cheated by the logic of the new mathematical framework" (1972:29).

If truth is fundamentally a conformity and scientific truth a correspondence, the definition appears at face value, formal and overly linear in its operation. Conformity and correspondence become a unilateral 'process' of prefigured attachment and direction to an preexisting structure and order of scientific canons which operates on the very same criteria which science is publicly viewed to make itself understood. Thus, the referent is not considered commensurable according to scientific ideals if it is not repetitive, consistent, precise, demonstrable, operative, etc. The "old" philosophy of science of the kind of logical positivism for example was markedly exclusive of its confines, monolithic in its positionings, and quite distinct in its formal semantics. Even its public, evidenced by its semantics was exclusivistic. The implications are worth noting.

In the context of a prefigured structure, definitions are tautologies and operational procedures, redundant. The raw materials of science such as the inanimate are by all means non-reflexive by their natures and their science follows the same non-reflexivity. Discoveries and inventions are treated with some measure of royalty but legacies lose their steam and they are promptly consigned to to well-edited histories of science. The defacing of man is the end result of the extinction of what happens in between the pole of origin and authorship, and the pole of canonical referents. Decentering follows with the disappearance of the face and embodiment of authorship together with the ramified processes of autobiographing the canonical referent. The center of "interests" gravitates in its entirety toward the latter.

Science in this style and manner purveys its truth that spells both: first, the 'good news' of products for everybody, and the 'bad news' for philosophers of science. Conformity and correspondence subsumes everything else as expendable variables. The canonical referent stays as the constant obsession, the sole life of real futures. Thinking ceases to be mere ordinary thinking. It evolves into a speculation of the 'futurables'.

II. Configuring Objectivity

Editing as a necessity in scientific reporting has its merits indeed, and this precision is the central character in the process of molding and shaping the scientific mind. Scientific truth like other forms of truths is an engagement in structuring and configuring the real.

This is an editing process. The imagined or virtually real is processed in what is a problem-solving game, modeling a construct of one's personal interpretation of the solution to the problem. This involves a stock of character to sustain persistence and emotional bonding with purpose (Castillo, 1992:52-80).

Objectivity however is "what thought has worked out, put into order, understood, and what it can thus make understood" (Ricoeur, *ibid*). It is a Lego work of assembling a configuration through a series of trials and permutations. The scientist's bonding with his experiment dreams of having his construct accepted by the community of scholars and scientists and therefore, canonized as referent by his peers. At this point, the social forces such as peer influence, issues on relevance, the economy of politics, etc., emerges. What before was personally construed as a subcultural determination emerges into the fora of public scrutiny. How does understanding take place in this community? How does the merging of minds between the scientist and his immediate community of peers take place?

A particular methodology is involved in this process of structuring which molds a specific culture not only for science and scientists but for a wider circle. This is a fact of common experience of life imitating science. This is what Alvin Toffler (I. Prigogine & I. Stengers, 1984: *Foreword*) describes as "feedback loop" catalysis. Here, Toffler transmutes and transforms a chemical phenomenon into its reflection in the society of humans, e.g., the impact that a small chemical perturbation could change gigantic structures in both organic and inorganic world. This is termed a "cross-catalysis" which involves an experiment that imitates life. The scientist in the laboratory obtains his inspiration of viable research programs from his "reading" of society's post-needs. It is a sort of "cross-cultural" dilemma of choosing the problematic that engages the artificial, made-up culture of an experiment, and the culture of a shrinking universe. This is a complex situation which requires hindsight on the part of the scientist to read the linkage between *in vivo* and *in vitro* situations.

This circle of mutually bonding poles does not only communicate in a circularity but at times, moves on to a spiral trajectory. Ilya Prigogine (1984: *ibid*), who won the Nobel in 1977 for his work on the thermodynamics of nonequilibrium systems, insinuates this phenomenon as a "dissipative structure." This is a newly modeled construct which evolves from a series of positive feedback loops which Prigogine

terms as "bifurcation points." Bifurcations are not very predictable and the measure of their success lies in their being able to factor a dissipative structure which creates, rearranges, or reconstructs existing structures. The approved and accepted structure matches and corresponds with the 'expectations' of the approving public specifically the power centers, the postulates of influence so to say.

In particular, Toffler's analysis brings to the fore the qualitative, ethnographic themes of the shaping impact of science of society at large. It is a subjectivity of science being objectivized in its societal parameters. This is the stage which Einstein (1934:224-227) calls the higher realm of interface between different cognitive parameters where the scientist turns artist, painter, poet, and speculative philosopher. But as we shall soon see, this is not how science is perceived as a subculture.

III. The 'Backing-out' From Objectivity

This is the culture of 'backing-out' from its original tangible materials and reduces these materials into quantified and mathematical forms. This form is the only accepted canonical representation of what is considered objective. Only the mathematizable is acceptable and this is produced by an instrumental methodology very specific to its concerns. Scientific truth is truly an experimental truth.

'Backing-out' of the scientific enterprise is the product-turning of its back on its materials. It is also a phenomenon of turning away and excluding the identity of the scientist if we want to engage in scientific talk of no more than the canonical product, vis-a-vis, what is strictly scientific. Aside from the latter, everything else is reduced to a presupposition and are not subject to instrumental readings and scientific reporting. It becomes a culture of avoiding and distancing from the past and even the present, current world. All this is contrived with the professesional expectation of reconstructing the present, and constructing a separate world which is paradigm of scientific ingenuity.

Life in this context assumes all the semblance of speed, technology, globalization, and fast lanes. It is a 'backing-out' with nothing in its agenda the seriousness of looking back, and if ever, to be quite selective. It is a 'backing-out' to constantly look forward and ahead,

over heads. Scientific truth undergoes the process of fission and cleavage and nourishes itself with its own cultural creations as product of its activities. This reductionist process does not exempt any.

Man and his culture, including his natural environment are no longer the measure. Nature as physis reverts to its initial status of materiality and is exhausted of its utilizable resources. It has lost its role of ethical identity of *Magister artium*, or the Teacher of the arts. It is merely a *Fons materialium*, or a source of material resources. The same logic is passed on to generations of scientific enterprises and technological projects.

These are all measured according to the sweeping terms of its brand of objectivity which is short of utility and productivity. Science is a culture of suspending all other considerations which it distantiated. This removes primal hierarchies and dissolves past syntheses. This involves a task and a vision which forges an ambitious dynamism of movement and function, of supremacy and excellence, of clarity and dogmatism (Ricoeur, 1992:72). Science encompasses a given culture into a process of its specific reconfigurations into a circle which is, in all intents, an experimental arrangement. Science dwells on its restless, circular, redundant temporality.

IV. Objectivity in History of Science

The use of the traditional histories of science may be worth the controversies regarding their use or disuse as data source for philosophy of science. As an edited source, this material suffers from a similar malaise that scientific reports have, both having gone through the rumor-mill of expectations and influence.

Hans Blumenberg (1987:667) writes: "The retrospective angle of vision of the history of science does not perceive the byways, detours, and blind alleys because it acknowledges as an "event" only what led further, in this way, the course of this history gets the appearance of a logical sequence, but each of the components loses the quality of action. But historiography has to understand events as actions, and it does so by trying to imagine the distribution of possibilities and probabilities in a situation at the time." A history of science as source for philosophy of science provides an expanded form of a textbook in science.

The prevailing controversies does not provide a better option in the the direct use scientific reports either, for similar reasons which the traditional histories suffer. Obviously, the use of scientific reports endangers the careers of philosophers who never had any experience in the scientific enterprise beyond liberal arts electives. A direct use of scientific reports toys the same possibility of severe algorithmic pitfalls which history of philosophy of science has provided us enough "How-not-to-do-it" lessons of caution. One is open to the dangers of logicism, logical positivism, logical empiricism, falsificationism, etc., (Nernessian 1990: 5-29). These are the 'standard accounts' of what previously were taken to be philosophy of science which we now append with the 'old' philosophy of science. In general, the 'standard account' circles around two thematics: reductionism to their respective empirics, and what Nernessian calls a 'double-language' approach to scientific theories, vis-a-vis, a theoretical and observation language. While over the years of these ideologies modifications have been introduced, the essential features and components have remained intact.

It is to be noted however that common to all the past and current philosophies of science is their universal affirmation of the need of 'modern science' as starting point. The statement is all for the best. As psychologists oftentimes diagnose, we differ in our respective contexts of awareness. Is the context open, closed, mutually feigning, or of suspicion? The depth of awareness and context is revealed in the 'quality' of philosophizing that responds to scientific practice or of science. The art and manner of philosophizing ought to advance science by way of a better understanding and intelligibility so that scientific enterprise goes hand in hand with scientific truth and objectivity encased in scientific theory-meanings. Any philosophizing on science which is not of science vis-a-vis, a part of actual scientific practice turns into an *a priori*, formalistic, linguistic, not to say imagined practice without the examination of the subject (Nernessian, *ibid.*). The problematic of the intention of the 'standard account' is not misleading perse. The problem with the problematic lies in 'meaning' what the 'standard account' is actually trying to say with the approach and methodology it is implementing.

Does the problematic require a kind of 'fieldwork' in the laboratory? Does the problematic 'back-track' to the roots and elaborational stages in the formation of the canonical referent, or does it simply

take off from the referent? Similar questions could be raised which confront the issue in a straight forward manner that cuts into the basics of both positions. Scanning them both reveals that alluding to the same starting points do not necessarily make both positions produce the same results. This is a fundamental issue of the objectivity of scientific truth.

Indeed, we must say that this paper does not include the intention to 'back-track' on the 'standard accounts', but to 'back-out.' This does not even state the implication, that the use of scientific reports decenters the engagement on philosophy of science towards the decided advantage of scientists-turned-philosophers which appears to be the more congenial route as shown by exemplars and paradigms of the field as Einstein, Prigogine, Medawar, Yukawa, Heisenberg... This science-to-philosophy route creates a more reliable philosophy of science presuming that the referents are anatomized beyond survey forms. Prigogine et al. possess the advantage of having experienced the genetic, the incubational, and the canonizing stages of the referents.

V. The Anatomy of Objectivity of the Autobiographicals

But are we philosophizing or empiricizing? Is our work philosophy or science? This is a common question raised by philosophers. But the question easily reveals its unconscious presuppositions and inner philosophical infrastructures.

The other alternative indicated earlier by way of the history of science route has emerged. This is known as *autobiographicals written* by canonical scientists which include varied amorphous materials as their diaries, notes and notebooks, personal letters, conversations recorded by their colleagues, etc. These are the preedited original materials composed by the scientists during 'real science' stage which antedates editing for scientific reporting and public presentation. This includes a built-in chronicle of the history 'hand-written' by the scientist himself. This the reason why 'real science' is also called 'private science' to distinguish the former from 'public science' which Gooding (1990:*Preface*) calls 'a form of literary criticism.' Understandably, the public form is cosmeticized for a more facile general dissemination.

Understandably too, history cannot be purely a history of objects but primarily a history of men dealing with objects in an enter-

prise or activity. The subjectivity which philosophy of science deals with in the proper sense is beyond the personal subjectivities which psychologists consider their competence and department. The subjectivities proper for philosophy of science interfaces with objectivity which emerges from its contexts of network of beliefs and problems (Nernessian, *ibid.*:29). This is suggested as the objectivity which results from the subjectivity of reflection of *autobiographicals*.

The world and its natures are primordially intuited as a reality independent of our minds. Experiment and its methodology constitute its own objectivity. But the route from this point to the canonical referent is long and winding. To rediscover these traces, there is the need to process rectification which delayers the referent from its pragmatic public form. Delayering is meant to reveal the empirics of access as necessary details of perceptions and overall themata or cosmologies for an objectivity (Castillo, 1993:49-55). These are not mere interpretations of facts which are assembled into a construct. Rather, the facts and their 'standard' interpretations are reexamined in a broader frame. Does the philosopher have the experience or posteriority to dictate on the historian of science which is specifically 'objective'? In the same vein, does the historian of science possess the 'objective' criteria that makes science intelligible for the philosopher?

It is our position that the scientist makes his own personal interpretation according to his subjectivity of first hand experience. This is done not without a background theory of his personal and social networks. The 'standard account'-based philosopher of science is limited to and takes whatever the historian of science makes available. The *autobiographical* is in the final analysis I propose, and the actual exercise of the very scientific project, that is best instructive for whatever philosophizing that can be dignifiedly achieved. On this basis is the decision to be made, between good and bad subjectivity, and the appropriate subjectivity that interfaces into objectivity (Ricoeur, *ibid.*:22). This is not saying that the 'standard' histories of science do not matter at all. They do have immense value for other pedagogical purposes albeit 'standard' too, such as the dissemination of exemplars. But the argument is clear between history of science as text and 'texting' history of science in their autobiographical forms as documentary evidence.

Configuring scientific objectivity is clearly a reconstruction of the 'real' of science in order to construct the whole picture. The correspon-

dence theory of scientific truth is a posthoc event which is intrinsically dependent on its varied antehocs. The former is linear in form and does not present the latter's essentially nonalgorithmic events and meaning of what it is saying to the public. Rereading means reconfiguring the authorial scientific texts and revisiting the 'actual locations' of the original experiment which has led to the canonical referent. The autobiographicals are made to speak by reconstructing the original experiment and retracing the 'byways.' This kind of interrogation of the original materials unmasks the objective scientific facts and virtuals which constitute the most credible sources for scientific objectivity of truth. In this determined forum solely can the philosopher of science truly present his philosophy as being of science. Similarly, in this manner alone can it be said that history of science as a credible source of philosophy of science does have the credential of a document, vis-a-vis, a primary source. In this way, the 'literary criticism' of the 'standard account' continues to be a criticism of sorts, by using the reconstructing 'do-able' as basis for both its 'think-able and the say-able' enterprise in philosophy of science (Castillo, *ibid.*:52).

VI. Autobiographical Themes

Reconstructing autobiographicals is the task of rewriting experimental narratives to bring out the visual element from their complex plethora of subjectivities. This is the 'texting' process of a documentary. Discoveries are 'explained' by their respective 'discovering' processes. This mode of philosophizing on science creates several thematics. Some of these are the following:

1. *Science is essentially reflective and recursive in nature.* The critical nature of scientific method involves a constant delayering or 'peeling-off' process particularly in the mediate stages of the experiment. The various stages that an experiment undergo prevents the univocal and unilateral decision of a historian of science to arbitrarily choose a particular stage, much less the final stage, as the "foundational elements" of the 'successful experiment' as terminatively interpretive. It is all too possible in an experiment that the initial and heuristic stages are unrecognizable in the either, or in both, the mediate and terminating stages. The anterior influences of networks are pronounced and significant in the initial stages of an experiment, but this is not saying that their presence is no longer possible in the latter progressive stages of the work. In the analysis of Lorentz' works,

Gooding discovered that the main attitudinal factors which contrived into the discoverer's 'philosophizing' were his instrumental and constructive approaches to physics, his focus on problems in optics, and the influence of Maxwell's equations (p. 151). To judge a particular stage or stages as significantly interpretive independent of their respective antecedent or proximate stages, of which the "foundational element" is a part of, or related to the whole experiment, is positing the fallacy of strict causality of conditions-therefore-effect form of linearity which is diametrically never the case.

2. *Science is made of interrelated set of themata.* In a larger fora, the preceding case posits the importance of considering other documents used as tools in other fields, e.g., philosophy, not only in science, other than the *autobiographical* document being considered. Einstein's background of beliefs and problems for example which led to his elimination of aether were the *Gedanken* experiment, the philosophies of Hume and Mach, the problem concerning the state of motion, etc. (Gooding, p. 152). Specific thematics such as these, aside from those of general forms (dyads of opposites, conservation, scientific icons such as the dualism of matter, etc.,) always underlie a particular period of history which is its "social space" of interpretation. Particular themata of separate disciplines of the same period may serve to either confirm or weaken the demonstrative approach that is being considered in the analysis of the scientific text by a historian and philosopher of science.

3. *Science is a process which stages a historical activity.* In the 'technology transfer' of transposing the autobiographical to 'standard accounts' histories of science, a similar degree of 'care' is to be observed as in the case of translating philosophy texts from one language to another. Language and translation here constitute more than the availability of technical skills. Translation is more than the skill of transliteration and language is more than a verbal expression. Language comprehends pre-verbal forms or the 'space' which may hardly be verbalized forms but which are nonetheless expressed or 'said.' This is not an exercise of 'reading-into' a text, but rather, this is a familiarizing exercise of 'listening-from' the document. In the context of science, these are called the 'virtuals' as in the discovery of subatomic particles. The 'competent' translator is one who does not only know his society's language and the original language which shapes the text. He must also be aware that histories of science continue to 'write' and

they are never written. The canonical referent as empirically relevant is not a dead end. It should rather be better considered as a 'longer pause' waiting for the stable points of a set of bifurcations in the continuative task of science.

4. *Science does not divide and separate the context of discovering from the context of justification.* The *writing* process of the scientific narrative by the scientist is to be distinguished from the process of recording details. *Writing* here is taken in its expansive view as distinct from a limited form of *recording*. In the received view of science, a canonical referent is treated as a recording, and its history, a written text. On the other hand, discovering and justification are essentially intersubjective as the different stages of an experiment which is by nature interactive. They always go hand in hand, even beyond the final stages of the canonical referent. The philosophy underlying a particular stage of an experiment may vary as the experimenter proceeds from one stage to another. Does this impy that a philosophy of science which originates from the referents as the received view assures is untenable? This appears to be so.

5. *Science goes beyond its method if scientific method is to be taken in its linear algorithms, logics, and inductive forms.* Scientific method in this case misses its ontology and degenerates into a methodism which makes it very facile for analytical philosophy of science to engage solely in the canonical referent which is the only thing left with the disappearance of the 'real' science of the discovering process. It is clear from the hypothetico-deductive model for example, that there is little space if at all for experiment to deliver the 'true' news apart from the 'good' news of an engineered 'standard account.' In the strict sense, the 'true' sense can only come from an experimenter which allows his experiment to express its information and language. The 'good' news of the 'standard account' refers to an experiment which is designed to provide desired and predetermined language. Formalizing the scientific mind and the engagement in 'literary criticism' are expected corollaries here. In this case, the counter proposition that argues that there is no such thing as scientific method nor a logic of discovery assumes a very tenable position. Logic and linearity characterize formalized engagements which does not allow any space for reflexivities, anomalies, and bifurcations. In an experiment, 'testing' continues, as 'texting' does of scientific documents, even after recording of results have terminated. The scientist-discoverer

continues to 'write' the narrative even after the specific experiment have been deemed publicly 'closed.'

6. *Science is beyond laboratory experiment not only in its critical conceptual forms, e.g., its mathematics and logic; but so too in its experimental skills.* Science is not a simple case of procedures and results. This confronts philosophy of science' innate cognitive tendency to 'level-off' mediate perceptions and observations of the scientist on account of the philosopher's difficulty to create the proper representations of these accounts. How does the philosopher of science represent in a discourse what scientists do not verbalize at all? If this preceding problem is 'attempted,' how does the temporary construct of philosophy of science which springs from 'outcomes' jell with its pre-verbal forms which obviously are important to represent the construct and its hermeneutics appropriately?

7. *Science is environmental.* In its holistic form, science is not only considered in its materiality, but also with its corresponding virtuality, symbols, and metaphors. It is not simply limited to an issue of laboratory work and results. This is too myopic a view of science. The laboratory of science precludes the world outside the physical contraptions of equipment and controlled situation. There is an 'osmotic' relationship that charges the communication between the artificial set-up which is the laboratory, and society at large which is responsible for the 'brand' of science that it patronizes to influence its life. It will always be the kind of science that will prosper which society nourishes and dictates with its postulates of influence. Science is therefore fundamentally a communication and exchange between the language of the laboratory and its societal forms making the scientific enterprise a task which is rarely operated for its own sake. Necessarily, it becomes a corollary that an ethics of science is unavoidable.

8. *Science is more procedural than simply being a set of accepted procedures.* The term procedural implies mediateness of skills and an art of laboratory protocols which are inherently of evolutive nature of underlying concepts and critical percepts. The current concept of a field for example is the present concept, it is not however the concept (Gooding, p.153). It goes beyond the current knowledge that never masters the art of a 'fluency' of problem-seeking devices in both its materials and in its social criticism. This is the 'turning' that philosophers of science should always watch out for, though such event does

not always present itself in clear categorical terms. An experiment is everything but linear.

9. *Scientific theorizing is reinventing the internal narrative of a set of propositions which is far from being purely propositional or sentential.* It is a reasoning process which does not necessarily derive direct logical sequence from its experiment. But scientific theories are only good in as far as they can be worked out. The work of the hand is the source of the thinking made by the mind. The fertility of mental experiments is only possible with the constant contact of 'familiarization' with the details of a specific experiment. Knowing the operating principle does not guarantee success of being able to work out its practical application. It is one thing to have the principle, it is another thing to grasp the details that a particular experiment involves. Reconstructing the experiments of canonical referents seeks to discbver the operating principle. This is not always an easy task and the philosopher of science may have to reinvent such principle. Since inventions and discoveries are everything but algorithmic, a process called cryptanalysis is suggested (T. Lai, 1991, 327-337). Cryptanalysis is code breaking of a cipher. This process involves a question of procedure and a question of evaluation with an eye on clues that lead to the delayering of a concrete and practical situation.

10. *Science is disabled in the context of traditional epistemology of the autonomy of subjectivity.* The appropriate epistemology of science connotes a constant processing and dispositioning of the philosopher of science with both, the laboratory and the world of its consumers. The skepticism of a scientist is one which is open to a rereading of the scientific document and its reconstruction. Private laboratory experiences are similar to the stipulated materials of an experiment. They find meaning in a whole, and are meaningless as an isolated object. Science is a collective construct which is intelligible only through its details. It therefore includes the processes of the 'privileged status of the unfamiliar and the unexpected bifurcations so that even if these are represented in analogical representations, their inner meaning is conserved in the reservoir of their *autobiographical.* Subjectivities as subjectivities may perhaps be the main concern of psychologists, but science is unimaginable and is not possible at all without them. The latter does not take them as mere bundles of impressions as subjective idealism does. More appropriately, it is rather a scientific realism which is called for, which recognizes the objects of

confirmed theories that includes as real, the unobservable entities. The philosopher of science may do better if these subjectivities are treated with reproductive epistemologies which move science onto different subjectivities that goes beyond phenomenalism.

11. *Science is neither purely analytical nor is it none else but a romantic adventure of imagination into the unknown.* It is both. There is poetry in science as there is a lot of bookeeping (Medawar, 1990: 32). It is a dialogue between these two episodes of one complementary task for the advancement of the scientific enterprise. Given this, the distinction between pure and applied science is academic. Science is definitely not a task for the Millian induction which canonizes a set of facts as 'faithfuls' of general laws. This is a failure to distinguish between man of discovery and the man of proof. It is one thing to frame a hypothesis, it certainly is another matter to test it. The former is the work of the imagination of the mind, the latter is an analytical and critical process of the hand. In this binary sense, an experiment is a critical act, not simply a contrived creative play in the Baconian sense, which tests a hypothesis.

12. *Science is objectivizing.* Science does not impose, it states (Schroedinger, 1992: 117). Science is a dialogic between the scientist, his culture, and his 'materials' in the broad sense of the term. For dialogue to be undertaken, the human 'materials' ought to enjoy the free play to excel, and the sincerity to respect the truth which is always the winner in any dialogue. Dialogue is never possible without these components which serve as necessary 'ought-impositions.' Carl Jung is quoted by Schroedinger to emphasize the fundamental point that "all science is a function of the soul, in which all knowledge is rooted... It is the *conditio sine qua non* of the world as an object" (*ibid.*:119). The mind cannot afford to exclude itself from the construct it has formulated. Effecting an observation relates affecting the observer. Objectivity is sorely disabled by the boundary-exclusivity consciousness of science. The world as given, is given whole. The ultimate object of science must be the whole. Assundered, the world is no longer intelligible. An incomplete being is always a chimera.

13. *The science of Philosophy must opt to abbreviate its individualism to the nuances and context of Science if it opts to pursue Philosophy of Science.* It is necessary to initially posit that science and its experiments must necessarily have their underlying 'philosophies' of

action, analogies, construct-configurations, meaning variance, etc. These constitute the germ of a viable philosophy of science. Philosophy of Science at this point of its history may have built its storage of descriptive vocabulary and established practices. But like science as its focus of interest and expectations, these 'historied praxis' will continue to be relevant for Philosophy of Science if they are construed not only in their context-ladenness, but specially so in their dynamic embodied forms of flux and emergent natures. A Philosophy of Science which nourishes solely on 'outcomes' as in canonical referents and neglects a philosophy of action and agency loses out its merit and dignity which the job description of the term philosophy of science implies. Inevitably, the philosopher of science will have to be cautious of the internal meaning variance that takes place within the experiment, and the language transformation that must take place from science to philosophy. It is very clear that any philosophy of science must feed on the specifics of necessary and sufficient conditions of scientific praxis over and underneath scientific canons.

The preceding insights we have culled are by no means exhaustive. Absolutely not. If it is the 'right' form of science, it must be fertile in nature. This open-endedness is to be expected in science when man as experimenter and man as affected, conscientious, and critical participant-user, cannot be disjuncted and separated.

VII. Beyonding Objectivity

The atomic theory of John Dalton is dated by its 'standard account' on 1800. As a budding scientist, Dalton was engrossed in the study of meteors and specific gravities. In his perusal of Newton's Principia, he admitted that if the gas particles repel each other with a force proportional to their distances, then so will their pressure and volume relationships. Dalton grabbed this relationship as a proof that real gases therefore must be made of forces and particles. This gas particle is surrounded by a caloric fluid which is endowed with self-repulsion. Given different types of gases, then we have different sizes of gas particles. With these data and interpretations, we have an explanation for the absence of equilibrium in the atmosphere. Despite the series of discrete and disjunctive interpretations, Dalton formulated several concepts on the chemical atom, atomic weight, the law of multiple proportion, etc. Here, we have a concrete example of a set of canonical referents without their respective proportionate causes

(Castillo, 1992: 52-80). Schroedinger terms this the 'uncertainty principle' which connotes the alleged lack of strict causal connection in nature (*ibid.*, 118).

I relate this episode to illustrate what we have all along been trying to argue. This case is not rare in science. Reconstructing *autobiographicals* will bear the experience that this episode is more a rule than an exception. How does the philosopher of science confront the many samples of 'illogicality'? Do we simply by-pass 'errors' omitted by a formal logic framed by the mind at the expense of 'illogic' done by the hands? Formalizations of the 'standard accounts' of histories of science and the received view of philosophy of science rarely render importance to bifurcations and crisis points. They are neatly repackaged in such way that overlooks the 'exceptions.'

The prestige of John Dalton makes his 'errors', judged by the absence of logic and causal connection, emphasize the incontrovertible fact that configurations of canonical referents do not necessarily follow the logic of expectations and interests of the experimenter. The stable forms are borne out in the critical operation of selectivity. The candidate canonical referents exhibit them when they are subjected to further tests despite the unexpected crooked route taken by the experiment. This is construed as a proof among among several others that the 'other' route hardly taken by the 'standard account' which is considered 'illogical' merits more than serious a consideration.

Episodes of this types can only be induced from *autobiographicals*. No doubt, they provide us the 'truer' story through the operation we called the 'back-tracking' rectificationing process performed by the philosopher of science using *autobiographicals* in reconstructing scientific activity by renewed subjectivity of reflection. This is to reposition philosophical infrastructure of philosophy of science beyond a philosophy of concluded products toward a *reproductive* process philosophy of science. Extreme positivism which relies solely on outcomes which are tangible, overlooks certain gaps in the experiment where otherwise are found virtual messages of positive bifurcations. It therefore misunderstands the specific metaphysics of varying levels of reality found in an experiment and fails to 'read out' a more appropriate interpretation of the 'whole.'

This disables science to create itself. A disabled science disables man. This is a caricature of an a priori insistence to make science

speak the way we want science to speak, and behave the way we want science to comport itself to its publics. This is not science at the very least.

This phenomenon is reflective too of a defective subjectivity which keeps the artificial doors of science remain compartmentalized and prevent the pathways and passable to breed an objectivity which interfaces the empirical, interpretive, and critical dimensions (R. Bernstein, 1983:X). Science is properly a *holisting* enterprise.

Scientific method is essentially a self-critical method which ought not to content itself with analysis and synthesis. Otherwise, this is taking scientific method as an algorithmicism. Algorithmicism takes the tangible facts solely as real, and its procedures, the ones which are 'already' established. When the measurable facts are the ones solely dealt with by the positivist, relativism ensues. This is taking facts as facts and the past, as they happened. This isolates and breeds subjectivity into subjectivism and ceases to serve as a dimension of objectivity. The text of science which is perused simply as a reaction board fails to project itself into a different subjectivity which may put its 'darkness' in a different hue of the *bios theoretikos*. This is disabling the retrieval of a hermeneutics of science. Science and its objectivity should rather be taken as a pathway rather than an enclosure, a lighthouse rather than a milestone.

Science is essentially an explanation, a defense and/or refutation of a scientific event, which similarly is to be taken in the active sense. It asks a battery of questions such as: What is it?; What does it do?; What is its mathematical derivation?; Which are its consequences? It is the nature of both scientific process and product to be action events. A canonical referent is an accomplishment indeed, but it is on the other hand moving as it is waiting. The process of analyzing scientifically is in the very strict sense an act of explaining. Reconstructing the original experiment is absolutely not simply meant to be an anthropomorphic hobby, or the work of a philosopher of science-turned-archeologist. It is a task of commitment which aims to objectivize history, and the philosopher of science aims too, to objectivize the facts of the history of science by reincarnating the canonical referent in its foundational components. It is not just another repetition but a renewed retrospection which 'nourishes' the facts anew in the context of current consciousness. So, a reconstruction is neither

belabored as a simple reconstruction of a history, nor, and worse, to impose one's personal and private predilections on such history. Objectivizing in science is recreating and reinventing.

If there is a concerted need to reconstruct scientific texts to serve as credible scientific documents, there is a similar need to reconstruct the philosopher's mental infrastructure. Admittedly, both components go together and one can never be without the other. History of science in the form of an autobiographical document transforms and reorients philosophy of science into an authentic subjectivity as the appropriate dimension of objectivity. Science as the philosopher's materials is in a constant state of *waiting* and *moving*. This ruminating science. No less a disposition of *waiting* and *moving* is expected of the philosopher of science if he is to sustain his philosophical task and avoid reverting to the unfortunate lesson of the history of the 'standard account.' This caution becomes more crucial in our times when science and its philosophy have become encompassing. Science shapes both our minds and our lives into a consciousness of specific determinations.

Scientific explanation is a *mirroring form* of the society of which it is a product of. So, it has ceased to be a mere engagement of scientists, and less, of philosophers of science. This is the implication of the meaning of an event in science. Its activity pervades, as it interfaces several facets of society as an essential 'connective.' In this sense, scientific explanation abstracts to the level of 'great issues' which are neither fully justified and rationalized by the coordinates of the empirical and the analytic (Gerald Holton,1973: 47 et ff). The explanation as a proposition of a 'great issue' demands an added cultural dimension of 'unconscious pressupositions' and ethical decisions which are not a product of, or resolvable to the formal and analytical components of science. Globalization becomes a necessary trajectory for man and science because the scientist of the self, have become the scientist of man. Linkage is rationalized over emotional bonding. This is an analysis which never loses sight of what is whole, organic, and living (Prigogine, *Ibid.*). It is an analysis of chaos in order to gather the foundational parts into its whole. It is only an *in vitro* experimentation with the intent to recompose the *in vivo* totalities. Science as an important product of man is never meant to be a product for its own sake. Never before has the demise of the 'standard account' become more definitive. Philosophy of science becomes the philosophy of the science of man.

Contemporary philosophy of science begs a scientific objectivity which webs understanding and scientific explanation. The totalizing effort here is far from what we resist as totalitarianism. There is never an end to the former as a praxis of mediation, while the latter signals an enclosuring hegemony. The former is a mediation and a reproductive criticism, the latter, a conclusion which have lost its sense of wonder and mystery, e.g. its objectivity of reflection. This kind of objectivity confirms the value and importance of subjectivity as the play of options, of the value of trial and error as a *natural* human process, of the positivity of irresolvable interrogatives, and even of the necessity *of referents*. Playing is restoring the mind its rightful act of philosophizing on the indefinite and the inexhaustible objectivity.

If science and its history were to serve man its best, this would have to be in terms of their insatiable thirst for truth. Unlike the 'standard account' of truth which froze the life between the mind and its reality, science and its history would be at their best if the emphasis were made on the *insatiable thirst* rather than on *truth*. This rereading reorients the loci of focus. History of science returns to its original inspiration of being 'searching-again' or the encompassing notion of 'researching.' Rereading as 'researching' opens to different kind or another form of wonder. Science and its philosophy cannot afford to be different from this disposition and character. Then, it is not enough for the 'new' philosophy of science as an objective enterprise of scientific interrogation. It goes beyond to a *researching* of responding to an ever changing objectivity which is far from relativism. Researching is 'networking' as Nernessian coins the term for contextualizing beliefs and problems to emphasize the wisdom of the present. What is fundamental here are the events of *practice, activity*, and *enterprise*, which we have harped on consistently. This is the art of shifting combinatory plays of facts and observations in the spirit of *Meno*'s dilemma. This is the understanding of playing as substituting 'standard' combinations for different ones. This is demonstrated for example by William Thomson's idea of physical analogy between heat and electrostatics and between light and vibrations of an elastic medium (Gooding, 72 et ff). This is the principle of substitutionality at work. A problem-shift may illustrate itself better by shifting loci, from established sciences to new ones. This 'plays' the possibilities of similarities in form or what is known as isomorphism. Here, the previous theory may be suspended, another method is concocted, and a 'diluted' approach is tried to 'fish' for ideas. The problem-solving status of

objectivity transmutes into problem-finding. It is projecting into another presencing never tried before. There is an inherent reason that emerges. For understanding and explanation to be in the process of scientific objectivity in its researching framework, even some facets of the 'standard account' will have to retrieved and recycled from their genetic isolation.

Philosophy even if it were not of science, is a valuable source of subjectivity of reflection for scientists and philosophers of science as we may have insinuated in this essay by using a quote on understanding from Ricoeur. As demonstrated by Toffler, Prigogine, Medawar, Heisenberg, and a host of others of the 'new' philosophy of science, so much light can be shed on the various facets of philosophy of science in a broader 'cross-catalytic' interdisciplinary life-contexts. The much abused term of 'Modern' science will have to reconstruct to 'Postmodernist' science to render justice to the kind of science we have presented.

Clearly, philosophy will have to play the role of an *ancilla scientiae naturalis*, the maid of natural science, if it hopes to enter into any fruitful dialogue with science. In its practical role of application, philosophy's rule-transcending takes over rule-following. This is the lot of making use of autobiographicals and this seems to be the only credible lot to peruse. Philosophy of science in this objective stature will be more effectively equipped to advance the science it imbibes and it so wishes to understand.

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