Available online at www.elixirpublishers.com (Elixir International Journal)

Social Studies

Elixir Social Studies 133 (2019) 53539-53546

ISSN: 2229-712X

Paracelsus' Experimental Design as the Precursor of Test-Tube Babies and In-Vitro Fertilization: Its Afrocentric Relevance Beyond the Fabrics of Western Ethics

Christian C. Emedolu

Department of Philosophy, Faculty of Humanities, University of Port Harcourt, Nigeria

ARTICLE INFO

Article history:

Received: 21 June 2019;

Received in revised form:

12 August 2019;

Accepted: 22 August 2019;

Keywords

Paracelsus,

Experimental Design,

Hermitic,

Promethean,

Renaissance.

ABSTRACT

Several historians of science have tried to undermine experiments conducted before and during the Renaissance period. They tend to suggest that some such experiments were not, strictly speaking, scientific experiments. The historians often reduce them to mere trial and error trifles within the occult hermitic or magical tradition. But this paper takes exception to this sort of historical interpretation of scientific experiments conducted within the Renaissance milieu. A milieu deeply rooted in thoroughgoing humanism. The central claim of this paper is that there is no break between the sorts of laboratory experiments conducted in the Renaissance period and those conducted in the modern and contemporary periods. The basic aim, here, is to analyse the experimental design of Paracelsus and re-interpret it in the light of contemporary experimental design in biomedical researches. As it stands, the Paracelsian experimental design holds a lot of ingenuity behind it and showcases Paracelsus as a true mechanistic/Promethean man of experiment. Rather than see Paracelsus as a mere non-interventionist hermitic/alchemical man of nature, one needs to see him as a model experimentalist of all times whose relevance overreaches procreation demand in Africa. The method adopted here is principally that of textual analysis, tinged with the historiographical approach of reconstruction.

Introduction

Between the twilight of the mediaeval period and the dawn of the Renaissance period the proclivity for destruction was tamed by the poetic and soul-enlightening moods set up by the Florentine or Italian Dante Alighieri (1265-1321), Petrarch (1304-1374), and Boccaccio (1313-1380). This is to say that rebirth of learning brought so much relief and joy in Europe. Indeed, literary giants, great painters, magnificent sculptors and craftsmen made their wonderful performances on the world historical stage. The natural philosophers and hermitic scientists or alchemists (true harbingers of the experimental spirit) were also part of those that entertained and re-humanized the battered and war-weary Christendom (Europe).

Given this fact that the Renaissance era marked a rejuvenating and an interesting episode in European history, a balance was, willy-nilly, struck between the power to conquer, dominate or rule over mankind and, then, the power to master, subdue and exploit man's immediate environment in some distant lands beyond the frontiers of Europe. This led to the inauguration of the age of exploration and navigation which was given its celebrated impetus by the Prince of Portugal, Henry the Navigator (1394-1460). To be sure, he fought alongside his two elder brothers on their fighting fleet to recapture the Moslem-occupied seaport of Ceuta. This was a landmark victory in "the whole history of the struggle to retake the Iberian Peninsula from the Moslems" (Castlereagh 1971, p.26). After his landmark Ceuta naval exploits, Henry the Navigator felt the urge to sail to the coast of Africa, as graphically documented thus:

> The capture of the port had also taught him how effective sea power could be against the Moslems. Moreover, while in Ceuta, he learnt that the Moslem territory extended far down the west coast of Africa – farther than any European had yet travelled. And he picked up valuable geographical information about Africa from the merchants of Ceuta who regularly plied the caravan routes (Castlereagh 1971, p.33).

Apart from being the age of navigation or exploration and discovery of new lands, worlds or frontiers, the Renaissance was also the age of too many spectacular inventions and technological dexterity. But for the present purposes, my trajectory is limited to the experimental design of Paracelsus. Of course, there are other great scientific minds like Regiomantus or even the German Johann Müller who, according to R. R. Palmer, Joel Colton and Lloyd Kramer, "laid the foundations during his short lifetime (1436-1476) for a mathematical conception of the universe.He was probably the most influential scientific worker of the fifteenth century" (Palmer, Colton and Kramer 2007, p. 70). But, then, it is already known that the mathematical conception of the universe stretches way back to antiquity and did become the inheritance of mediaeval mathematicians and physicists. A few other figures are Leonardo da Vinci (1452-1519), and

Tele: +234-803-551-7505

E-mail address: Christian.emedolu@uniport.edu.ng

Nicholas Copernicus (1473-1543). Be that as it may, whatever glory that surrounds the Renaissance science came indeed as a bye-blow of the mediaeval science, which, in turn, was an off-shoot of the ancient empirical or experimental science.

Now, before one delves into any serious consideration of the experimental design of Paracelsus, I need to first define the nature of scientific experiment; I also need to establish the fact that instrument-makers had already known their position as master-craftsmen of scientific experiment. In point of fact, those master-craftsmen had a cognitive understanding of what scientific experiment was and its value in scientific investigation. The paper continues with a reconstruction of the special experimental design framed by Paracelsus. Furthermore, the paper addresses the issue of whether the so-called hermitic/alchemical practitioners of science ever had the capacity to practice experimentation and eventually cast a furtive glance at the significance of Paracelsian experimental design for the Africans. The paper ends with the ritual conclusion.

The Nature of Scientific Experiment

Whenever the term "experiment" is mentioned, there are certain allied or ancillary concepts that are evoked in our minds, such as "material procedure", "technique," "calibration of instrument" "design," "trial", "test-run," "manipulation,""measurement," "calculation," "observation," "phenomenal model" and so on. Nonetheless, a quasi-philological study of the word "experiment" shows it to be of Latin origin. This calls for a thorough analysis of the word. The analytic process will certainly warrant the need to play on the word itself. At any rate, this pun will not warrant my going beyond the sourcing of the etymological roots of the key components of the term under investigation.

Straight-forwardly speaking, the Latin word *experimentum* is a portmanteau word, with three different concepts packed or sandwiched together. The initial fragment "e*x*," stands for "outside", "out of," etc. The middle fragment "*peri*" is of Greek origin (as the Latins borrowed much from the Greeks), and it is linked to another Greek word *peras*, which stands specifically for "boundary", "about," "around," etc. We see it in such Greek derived terms as *perimeter* (distance round), *peripatetic* (*walk about* as in Aristotle's method of walking about with his disciples while delivering lectures in the peripatetic school), *peripety*, *perimetrics*, *periscope*, *periphery*, *peregrinate*, and much else. In fact, Heraclitus of Ephesus used the phrase *psychês péras* when he was alluding to the fact that no matter how far one travels one can never get to the "boundaries of the human soul" because it possesses the incomprehensible *Logos* (Reason, Word, Discourse, or what you will). And the final Latin fragment, "*mentum*," stands for "mind" (*mens/ mentis*).

Following the foregoing analysis of the concept, *experiment* can be literally defined as that which bypasses or goes outside the boundaries of the mind and verges on some sort of empirical observation, instrumental intervention, material measurement, and calculation in the study of the material and non-material aspects of the universe or nature as it were. This is precisely so because the transliteration of the portmanteau concept directly sees it as that which stands outside of the mind to physically observe, intervene, and explore the material or non-material world *objects* (*entities*/*denizens*), events and processes from all important sides or sequentiality in order to arrive at a calculable exactitude. In other words, the experimentalist extra-mentally peregrinates, manipulates and pokes at nature, waiting for some anticipated or crazy results. As such, experiment can be seen as an externalized thought, in terms of instrumental model, material procedure, and phenomenal model that aims at exploring and exfoliating nature with a view to understanding its mechanisms or components, as the case may be. But the journey must always begin from the human mind, and sometimes may end there – paving the way for what is popularly called thought experiment (*constructive* or *destructive*, as the case may be).

Ultimately, *experiment* could be defined in simple and rawest terms as an instrumental process, which searches and measures the depths of reality through the underlying principles of cause and effect. But this definition seems to beg the question of any *realist* investigation of scientific experiment, for it assumes that experiment studies reality before we set out to prove that experiment tells us something about the real world. Still, there is no way we can reasonably transcend this subtle difficulty, since it will even be worse for us to define it from the *social constructivist* or *conventionalist* or *operationalist* point of view which generally see experiment as some material practice that has nothing to do with the revealing of anything about the real world.

Be that as it may, Heinz R. Pagels broadly defines an experiment as "a controlled experience in which the conditions of the experience are systematically altered" (1982, p. 298). For his own part, Simon Blackburn sees experiment as "A controlled manipulation of events, designed to produce observations that confirm one or more rival theories or hypotheses" (1996, p.131). In the same vein, *The American Heritage Science Dictionary* (2005, p.223) simply defines experiment as "a test or procedure carried out under controlled conditions to determine the validity of a hypothesis or make a discovery". But in a more classic mood, Duhem defines experiment in physics as the art of "producing a physical phenomenon under conditions such that it may be observed exactly and minutely by means of appropriate instruments". In "Physical Theory, Mathematics and Experiment," Duhem's presentation of the above definition begins with some precise question and an adequate answer thus:

> What more does 'doing an experiment in physics' mean to anybody than producing a physical phenomenon under conditions such that it may be observed exactly and minutely by means of appropriate instruments? (Shapere 1965, p. 96).

Further still, Ian Hacking (a hardcore experimental realist) somewhat defines experiment as a skilful search or navigation into the inner constitution of reality for the purposes of understanding the behaviour of certain entities and using such knowledge for the advancement of technology. Put in a more comprehensive form, for Hacking, experiment is a creative enterprise that deals with skilful instrumental manipulation of entities (via some causal affordances) for the purposes of creation of phenomena, penetration of deeper environmental niches, and deployment of knowledge thereof in some pragmatic or distinct technological transformation of the world. In other words, experiment involves some kind of utilitarian adventure, "shaking out the folds of nature," prodding, "fiddling around" or trial and error (Hacking 1983, pp. 164 and 246). By this, Hacking expands the notion of experiment and insists that it must not be restricted to the analytic tradition of experiment, i.e., the "popular image" of experiment in the confined space of the laboratory (1983, p. 149). In this expanded view of experiment one quickly gleans the inclusion of some unique

tradition of experiment which may conveniently be called inventive or kitchen tradition of experiment with some sort of open-ended algorithm. Within this tradition, experiment remains "the royal road to knowledge" (Hacking 1983, p. 149). This somewhat explains why Hacking is very much committed to the heuristic (discovery) role of experiment. Of course, there are some other traditions of experiment, like the field tradition and the mimetic tradition. Here, it is quite intriguing to say that, Hacking seems to have solved an age-old problem of rift between theory and practice or knowledge and action addressed by philosophers like Plato, Aristotle, René Descartes, F.W.G. Hegel, Karl Marx and the Frankfurt School (critical theorists), to mention a few. This is simply to say that experiment, which is practice/action, was first given birth to by an initial knowledge/theory has now the capacity of directing or generating theories or knowledge.

In his famous discussions with Albert Einstein, Max Planck (the father of quantum mechanics) mutes that, "An experiment is a question which science poses to Nature, and a measurement is the recording of Nature's answer" (1949, 99). Karl Raymond Popper re-emphasizes this when he says that experiment "is always performed to answer a question or to test a conjecture which has been posed by a theoretician" (qtd. Arabatzis 2014, p. 194). All these definitions, as it were, form a special *ouvre* to a perfect understanding of the entailment of scientific experiment.

The enduring significance of experiment for the empirical sciences can never be overemphasized; for its urgency shows itself vividly in the lamentations of Roger Penrose (an ebullient mathematician, cosmologist, and physicist of our time) as he writes:

> The absence of experimental data relating to the normal quantum-gravity proposals has led to a curious situation in theoretical fundamental physics research… But since experiments in this area are absent, the efforts of theoreticians have been directed very much into the internal world of mathematical desiderata (2004, pp. 1013-1014).

Penrose, however, suggests that the absence of experimental investigation or experimental data in crucial areas of the empirical or physico-mathematical sciences should move all interested inquirers to ask "whether the accessible mathematical desiderata are sufficient to enable us estimate the chances of success of these ideas" (Penrose 2004, p.xxi). Whatever be the case, Penrose ultimately endorses the view that, real advances in the understanding of the physical world are made possible "through careful physical observation and superb experimentation" (Penrose 2004, pp. 1010). But this somewhat re-echoes the faith of Keat and Urry that, theoretical "statements must be objectively tested by means of experiment and observation, which are the only source of sure and certain empirical knowledge" (qtd. House 1991, p.3).As it stands, the generous exploits of experimentalists in the history of scientific investigations can never be undermined or dispensed with.

Instrument-makers as Master-craftsmen of Scientific Experiment

With the rise of Universities and their legally backed autonomies in the middle Ages, learning was on the increase in Europe. With relative peace and improvement on the economy so many Guilds or Trade Unions sprang up. The guild of instrument-makers saw the light of day from the late mediaeval period to the Renaissance era. These makers of instruments or inventors were often regarded by the scholastics as mere rustics or unschooled men. This assertion is, to a high degree, illuminated by A.C. Crombie when he writes: "Active practical interest of educated people may be one reason why the middle Ages was a period of technical innovation, though most of the advances were probably made by unlettered craftsmen" (qtd. Haden 1953, p.268).The interaction between the learned and the rustic instrument-makers continued to the Renaissance period. At the dawn of the Renaissance, we could still feel the impact of these so-called unlettered technicians or instrument-makers in shouldering the responsibility of maintaining the continuity of the experimental spirit in science.

Nonetheless, it is worthwhile to say that experiment truly belongs to the technical, craft or art tradition of the unlettered men, and science, *per se*, belongs to the theoretical, speculative or intellectual tradition of the educated. In other words, simple-minded craft, skill or *techne* was at a significant point in history rejuvenated by advanced speculation or *theoria* at a more sophisticated level to bring about (or *natalize*) what we refer to as modern empirical science. Sometimes this is carelessly interpreted as the celebrated marriage between theorization and experimentation. George Kubler did paint the picture of intimate connection between experimental science and pure art or craft when he writes: "Early experimental science had intimate connections with the studios and workshops of the Renaissance…" (1962, p. 10). The life of Leonardo da Vinci (the man of many souls – artist, sculptor, experimental scientist, and inventor) is, for sure, an extravagant proof of such pristine connections between art and experimental science in the Renaissance Europe.

A fisherman's son and a great philosopher, Nicholas of Cusa (1401?-1464), in his work (*De statisticis experimentis*) analyses a certain scholar willing to offer himself "to be instructed by an un-lettered man ('idiota'), a mechanician who tells him how some difficult practical problems may be solved by 'mechanical' [experimental] means" (Hooykaas 1987, p.460). Besides this, it has been muted that the Rhinlander Cusa's "mystical philosophy entered into the later development of mathematics and science" (Palmer, Colton and Kramer 2007, p. 70). This is simply to say that, mathematics or measurement at some point in the history of science became so glued to scientific experiment precisely because it has the powers of unlocking some of the secrets of Nature. Whence, the learned Peter Ramus (1515-1572) "sought contact with artisans (instrument-makers, painters, etc.) and frequented their workshops in search of information about applications of mathematics" (Hooykaas 1987, p.460). Needless to say, the mathematical vision of Cusa and Ramus for experimental science was captured by Galileo Galilei, especially, in *The Two New Sciences*, *Il Saggiatore*, and even in *Siderus Nuncio*, among others. In the thick of modernity, Isaac Newton (the Great *Amphibium* – astride of magic and experimental philosophy) was also among those who overemphasized mathematical measurement in experimental science in his *Principia* and *Opticks*.

Now, the workshops of the instrument-makers became the centre of worship for both the literati and the scientific minds. Given their experimental inkling, scientists often visited the instrument-makers' workshops to demand that certain specifications of some given instruments be made or forged for them. But one must believe this: The instrument-makers are not as idiotic as Cusa and the scholastics would

want them to be. What Aristotle said about the master-craftsman knowing the deep things about whatever he has created or brought forth rings true about the instrument-makers of the Renaissance period. As it stands, the instrument-makers or technicians do possess at least the intuitive knowledge of what any scientific instrument is, how the instrument is to be used, and what it could be used for. I say this because the role of the technicians even in our contemporary experiments has never been undermined. In fact, they are the leading light in any experimental design. The fact that they have been put through school in our time is even to their maximum credit – a condition that brings about perfect collaboration among the technician, statistician, experimenter and theoretician.

The ingenuity and dedication of these Aristotelian master-craftsmen kept the spirit of scientific experimentation alive in the Renaissance and beyond. To be sure, contriving an experimental instrument is always an effort to help the experimenter bridge the gap between nature and theory. Thomas S. Kuhn comments on the fabrication of the following instruments and the bridging of the gap between theory and nature thus:

> Special telescopes to demonstrate the Copernican prediction of annual parallax; Atwood's machine, first invented almost a century after the *Principia*, to give the first unequivocal demonstration of Newton's second law; Foucault's apparatus to show that the speed of light is greater in air than in water; or the gigantic scintillation counter designed to demonstrate the existence of the neutrino – these pieces … and many others like them illustrate the immense effort and ingenuity that have been required to bring nature and theory into closer and closer agreement (1970, pp.26-27).

In point of fact, bridging the gap between nature and theory is always a "constant challenge to the skill and imagination of the experimentalist and observer" (Kuhn 1970, p.26). Therefore, the making of scientific instruments is always the most marvelous event in the history of science. But, then, the scientific community is always too quick to push this glorious event behind the walls of technology, forgetting the fact that science and technology are two inseparable suitors mimicking and wooing that ever beautiful courtesan called Nature, who forever blushes and loves to hide, as Heraclitus of Ephesus said in antiquity. This leads me then to the Renaissance Paracelsus – to some special and particularly relevant experimental design he articulated or forged.

Theophrastus of Hohenheim's (1439-1541) Experimental Design

During the Renaissance period of Europe one could see an adept alchemist plying his professional trade in such an outstanding manner. This dyed-in-the-wool alchemist was no other than Paracelsus, whose original name is Philippus Aureolus Theophrastus Bombastus von Hohenheim. He was born in 1439 at Einsiedeln, close to Zurich, and the alchemist or abbot, Johannes Trithemus, was his tutor and master. This German probably had a medical degree at Ferrara, for he served as a medical surgeon accompanying an army that moved round Europe within a certain period of his life. He was, temperamentally, a very irascible, proud or haughty fellow and, eventually, died in Salzburg in 1541.

Paracelsus was loudly designated as a *homo mirabilis* (wonder-working man), owing to his outstanding intellectual capabilities, prolific writings and experimental skills. At the end of his life "…a whole school of Paracelsians battled with Aristotelians and Galenists over the course of natural philosophy and medicine alike" (Debus 2003, p.273). Paracelsus believed that authentic knowledge of the universe could be gleaned through direct experimental alchemy or magic. In his followers, he inspired "a strong reliance on observation and experiment" (Debus 2003, p.274). As a scientist, medical man and chemist, Paracelsus actually fought for the reformation of the scientific enterprise; hence the Paracelsians found themselves enmeshed in that great intellectual battle which petered out in the emergence of some refreshed aspects of what we often call modern science. Allen G. Debus captures this thus: "…it was primarily by defining their vision of a new science based on medicine and interpreted through chemistry that they found themselves engaged in a debate that was to be influential in the definition of significant aspects of modern science" (2003, p.278).

Strictly speaking, in the area of biotechnology, genetic engineering or applied medicine, Paracelsus can be considered as one of those whose ideas and visions ran far ahead of his time. To be sure, his eugenics surpassed that of Plato, who rather based his own idea on the natural way of selection and crossbreeding. But Paracelsus brought the triumph of experimental art into it by suggesting possible experimental ways of accomplishing *conception*, *gestation* and *delivery* outside the natural human womb. To my mind, what he articulated and showed experimental design for was the primordial theory of test tube babies and/or some form of in-vitro fertilization. In a way, it could be said that he dimly saw what genetic engineering, cybernetics, nanotechnology and other ancillary medical spheres hold for the future of man. At the same time it could also be said the he believed that the evolution of special breed of mankind could be wrought by human agents. In other words, we are at once both products of evolution and fast-tracking agents of it.

In *De natura rerum*, Paracelsus speaks at first instance to the effect that the alchemists can induce the generation of a human baby in a flask or the alchemist's glass. In his own words, these sorts of human entities "are brought to pass by art, in a glass" (qtd. Newman 1998, p.219). Paracelsus taught that this particular test-tube strain of mankind is produced from menstrual fluid. Being that they are generated solely from female fluid, they must possess all feminine impurities or weaknesses, and as such, he called them *basilisks* or monsters – a degenerate species of mankind. Here, one might be wondering the possibility of achieving conception solely from a female egg. But, then, to my mind, it is clearly an achievable feat in this age of nanotechnology, driving chemical transhumanism. Stem research itself is the shortest step to this so-called "monster" creation, dubbed *basilisk*. Of course, his major aim is not to populate the world with some such gruesome monsters or freaks of nature. He wants the best for mankind.

Paracelsus, at a second instance, describes another experiment that will foster the generation of more virile, refined and richly endowed human entities. He taught that such fine-grained species of humanity are primarily got from male semen and put or implanted into a detached horse womb, with commensurate application of heat for a certain period of time. These babies he called *homunculi*, precisely because they possess, to a very high degree, some intellectual and other masculine virtues, and they are pure or translucent entities. Now, I need to bring this a little bit

home to someone existing in my own generation. Using the in-vitro fertilization model here, if a sperm cell is extracted or harvested from male human semen, then, it must be put or embedded in a sizable vat (petri-dish) of nutrients for it to develop into a blast within one week. The blast is taken and inserted or shot into a designated womb (detached or not). The vat of nutrient is essential because the female ovum is not, after all, needed for gestation as Paracelsus and the latest scientific discovery in stem cell research has uncovered. Maturation will, of course, come to the baby, "little man" or homunculus if all the necessary conditions (temperature and all) are made suitable for it.

Does it now occur to anyone as strange that, in our time medical scientists are bugged down with the ethical issue of allowing the surrogacy of a female elephant for a human fetus? We may not go into the intricate argument on whether an animal of different species can host another in its womb, via in-vitro fertilization. But I do know that everything is possible with appropriate adjustments with some bit of philosophy of gradualism from test tube baby penguin, through baby sheep, and onward to baby human. Does it ever come as a surprise to anyone when Anaximander of Miletus announced that fish was the surrogate mother of mankind? In this pristine evolutionary theory, Anaximander argued that the reason is based on the fact that mankind, unlike other animals, needs a lot of care at infancy. Whether this logic is valid and sound is seldom my concern in this paper.

Meanwhile, the question is not whether the experiments suggested by Paracelsus yielded any results, but the most important thing is that he brought out or described some brilliant experimental designs. The fascination is increased by the knowledge that Antonie vaa Leeuwenhoek (1632-1723) was just close to the threshold of announcing the discovery of Spermatozoa and Bacteria through the use of compound light microscope invented in 1590. To that effect, I take a ready exception to Bas C. van Fraassen's ridiculing of the *homunculi* in the following hurting words: "when van Leeuwenhoek examined his semen under the new microscope, he saw these postulated fully formed little humans swimming around. Not only that, his friends (all male) saw them too" (1980, p.214). To my mind, van Fraassen should be schooled in Aristotle's metaphysical doctrine of potency and act. An attempt to make a reasoned judgment here brings about the realization of the fact that a sperm cell is potentially a human species (in its germ). After all, Peter Singer once argued that, "I can understand the view that fertilization is one step in the development of a person and that if potentiality is a matter of degree, the embryo is a degree closer to being a person than a collection of egg and sperm in a petri dish before fertilization has taken place" (1998, p.88). Now, without fear of sounding apologetic: say what any dyed-in-the-wool antirealist may, the spermatozoa were truly seen swimming around in the semen. Whether one chooses to call the sperm cell *homunculus* or the "germ of human species" makes no difference; exactly the same way David Hume's description of Robert Boyle's atoms as "little-bouncy-balls" is of no consequence to particle physics.

I insist that the drama of Paracelsus' experimental design or material procedure is even more scintillating or fascinating when one realizes that test-tube babies or in-vitro fertilization and cloning technology were a long way from him. When obstetricians, gynecologists, stem-cell researchers, genetic engineers, nanotechnologists, and some such related experts in our time begin to mass-produce eugenically viable *homunculi* outside the normal womb without the egg (awash in the female menstrual fluid), then the truth of what Paracelsus said will begin to haunt us the more. Genetics has indeed got to the stem-cell research level, wherein a single cell can perform any biological magic. As a matter of fact, the blast (ready-to-be-implanted *homunculus*) emanating from the intuitions of the genius, Theophrastus Bombastus von Hohenheim, should be appreciated, not undermined or underestimated. Blame is to be put on those who never see any possibility in what Paracelsus experimentally articulated and cannot even, at the moment, associate the glory of what he said with the nowadays Assisted Reproductive Technology and especially the invention of Ribosome – a nanotechnological machine that replicates humans. This shows that the alchemists, after all, had something meaningful to offer in the field of experimental science.

Beyond the Myth of Meek Orphic Hermitic Alchemist

Paracelsus has been penciled down as one of the hardcore alchemists in the history of science. In spite of its wondrous achievements, alchemy has been wrongly described as a brand of science or pseudo-science, as some may wont to say, that does not require much of the hardnosed mechanistic Promethean intervention in Nature. Now, both Heraclitus of Ephesus and Francis Bacon are of the view that Nature loves to hide and must be lured or forced in one way or the other to unveil herself through the mechanical or experimental art. From the unsung ancient history of evolution and development of science, the Egyptian priest-philosophers were tagged practitioners of the hermitic tradition of science. But this does not in any way suggest that they were strictly speaking gentle worshipers of Nature. They were ever ready to force Nature to do their biddings, especially, through the magical art. To be sure, the magical art itself is the very pivot of experimental practice, wherein Nature is subdued, manipulated and exploited (Emedolu 2015, p.73-76). Incidentally, Martin Bernal carefully unfolds that, Paracelsus belonged to "…a tradition which continued up to and included Newton, in which scientists justified turning to experiment as a way to retrieve the wisdom of Egypt… which the Greeks and Romans failed to preserve" (Bernal 1991, p157). The life of two bona fide or strong Renaissance alchemists, Dr. John Dee (1527-1609) and his associate Edward Kelley substantiates the strong bond between alchemy and empirical science. More so, this connectivity is borne out by the celebrated communication channels that Robert Boyle – the champion of the Royal Society of London – opened up or sponsored between the sixteen-sixties and sixteen-eighties (Hunter, 2001). To be sure, Isaac Newton never abandoned magical or alchemical practice in his experimental philosophy, which explains why he has regarded by most historians of science as a Great Amphibium (astride of magic and "thoroughgoing empirical science"). The link has remained inextricable up to this quantum Age of science.

Now, the true life story of an African alchemist or hermitic witch-doctor who risked his life in order to conduct an experiment in teleportation is emblematic of how Nature sometimes rebuffs or resists attempts aimed at raping or exploiting her by experimental means (Emedolu 2010, pp. 56-57). In the Western clime, a distinctive teleportation technology has been invented or developed through the quantum principle of *entanglement* which Albert Einstein

interpreted as leading to spooky action at a distance, precisely because it completely abolishes locality or space. As it stands, distance between two separate locations dissolves at the point of effective manipulation of the machine. Here, a full-blooded human person is made to disappear from one machine and made to almost simultaneously reappear in the other machine. To be sure, real-time magicians have also achieved this same fit without the aid of any machine technology. If the idea of space is so-punctured in teleportation and telekinesis ventures, then it means that the magicians have always been right in saying that everything is connected to everything else in the universe. All is one. An action performed at a very far distance can instantaneously affect something else at another location. This collapse of space might have been one of the reasons why Stephen Weinberg swore he can never imagine himself entering into that quantum mystery teleportation machine. So, the alchemist or the magician as a hermitic man should not be said to be far away from even the strictest form of experimental practice. He has the secret theoretical knowledge of nature – in terms of knowing what nature is (i.e., its quidity or secret essence), when to act on her (understanding "time" here as "chairos" or "opportune moment"), and where to get her entangled and make her submit (occult point in space). Ultimately, the magician carries out an experimental action – in terms of knowing how to manipulate nature and make her yield results. Therefore, knowing what, knowing when, knowing where, knowing how and why are all the special preserves of the magician as a second-sighted preternatural man.

To all intents and purposes, William R. Newman, in "Alchemy, Domination and Gender", reacts to some feminist writers who continually peddle the gossip that the alchemists (Paracelsus, among them) belonged to the *meek* hermitic tradition, instead of mechanistic tradition, wherein the theme of torture, violation and domination of nature is prevalent. To be sure, these feminist enthusiasts are completely wrong. Contrary to the assumptions of the feminists, Newman maintains:

> The theme of human domination over nature, so obvious in the Paracelsian *De natura rerum,* is frequently expressed by alchemists in the language of torture. The so-called hermitic tradition was not composed of gentle nature worshipers, as Merchant and Keller would have us believe, but of active interventionist's intent on turning nature to their own purpose.
>
> Let us briefly consider the work of Zosimos of Panopolis (4th C.C.E.), who appears as one of the heroes in Merchant's work (1980, 18). One of the most famous works attributed to Zosimos is his *On Virtue*, which consists primarily of a succession of dreams linked together by interpretation….
>
> But Zosimos has chosen to express this laboratory process in the unforgettable terms of torture and human sacrifice.… Zosimos wakes up and interprets the dream to refer to the production of alchemical 'waters' (1998, pp. 220-221).

So, whatever the twists of any argument, the alchemists retain the prestigious title of *experimentalists*. The alchemists in their occult laboratories have always been perfect prototypes of the Promethean investigators of Nature, not merely gentle Orphic observers and admirers/worshipers of Nature. Unfortunately, one such Romantic and Orphic worshipper of Nature speaks in Gothe as David Roochnik writes:

> In his discussion of Gothe's *Gentle Epigrams* (*Zahme Xenien*), which is the most sustained exegesis in his book, Hadot says that Goethe 'criticized experiments for trying to discover, by violent and mechanical means, something hidden behind phenomena, or behind the appearance of things'... This Promethean attitude is wrong-headed because 'to see Isis [i.e., Nature], all we have to do is look. She reveals herself without veils; she consists entirely in the splendour of her appearance' (2008, p.657).

The truth of the foregoing Gothe's statement is far-fetched. Nature does not revealed anything beyond appearances, unless she is prodded in some violent or mechanistic way. Nature, as it were, must be stripped. The meek, gentle or mere phenomenological observation of Nature can hardly yield anything that can be successfully described as scientific. Even in the quantum world, one can never be certain of the position of an electron until one begins to intervene by searching, observing, and measuring. Unfortunately, measurement in quantum physics brings about a catastrophic disconnect between the quantum world wave function and our "real" particle world.

Benefits to the African beyond the Fabrics of Western Ethics

Having looked at the Paracelsian experimental design and its realization or successes in our time, it is appropriate to re-examine the genuine possibility of adopting it beyond the bounds of Western-styled ethics. The African person has often been seen as one who cherishes life and respects its sacro-sanctity (Emedolu, 2018, pp. 9-27). He cherishes a boisterous life amid other persons; for as Thaddeus Metz declares: "…a major recurrent feature of moral thought in sub-Saharan Africa is the widespread maxim, "A person is a person through other persons" or "I am because we are" (2010, p.50). In another paper, Metz continues by saying that, "…obtaining humanness – *"ubuntu"*, as it is famously known among Zulu and Xhosa speakers in southern Africa – is entirely constituted by relating to others in certain ways" (2011, p.391). Looking at the foregoing, I seem to think that Metz ultimately summarizes his entire ethics or, more appropriately, metaphysics of humanization in Africa in the following words: "I strongly suspect that ethic of becoming more human through community with others is indeed something that Africa is well-positioned at least to offer the world" (Metz, 2012, p.60). This African communitarian (or Greek *koinonia*) spirit is amply demonstrated by Innocent Asouzu in his book, *Ibuanyidanda*.

Following from the above reasoning, the logical implication of the trail-blazing in-vitro fertilization effort of Paracelsus is that the African will go for it in order not to remain childless. It is a non-negotiable option for the African who cherishes the communitarian spirit. In Igbo culture of the south-eastern Nigeria, this philosophy is manifest in such names as "Somadina" (I cannot leave alone), "Nduribe" (I must be in the company of others), and so forth.

To all intents and purposes, the barriers intuited by Western-styled ethical thinking cannot override the fundamental ontological crave of childless couples all over the continent of Africa seeking to have children with whom to create the germ of a life-world (*lebenswelt*). The argument muted against in-vitro fertilization by Andrew Uduigwomen, say, that, "…many embryos are wasted in the course of

trying to get one to survive" (2003, p.170), may not hold water, since improvement in biomedical research will always lead to a scenario, wherein one viable embryo of whatever desired sex can be selected for IVF. I somewhat think that at this stage of procreation process, the African believes that moral consideration must be suspended. After all, Christian C. Emedolu declares that whenever life is involved, the African operates at three different levels of consideration, namely, ontological, ethical and religious levels (2018, pp.13-25). For the traditional Igbo, particularly, if life can be added on to the community (via modified Paracelsian approach) no one would ever bath an eye lid. Hence, Emedolu argues: "Since *ndu* is ontologically supreme, neither religious sentiment, nor morality can stop a reasoned quest for its protection within an authentic Igbo community" (2018, p.13). The most important thing for the traditional Igbo is that a child must first be born into a human community and named thereafter before any integration or socialization process begins to take place.

The ultimate dream or ambition of Paracelsus was to produce the best crop of intelligent humans. Here, there is no teasing out or gainsaying the fact that, Paracelsus' experimental design was, indeed, an apt exercise in eugenics, which possibility has been realized in our time through advancements in technologically assisted reproduction via intricate developments in genetic engineering, cybernetics, nanotechnology, and so forth. With some such large crop of intelligent humans injected into African communities, Africa will surely be better for it. And "being better for it" simply demands that Africans shall have learnt how to take care of their own destinies.

Conclusion

It is worthy of endless reiteration that experimentation did not just fall from the blues of modernity, but has its own long line of history, alongside the weak science of the past. Having had much truck with Paracelsus, it is somewhat proper to say, of course, that he was a great chrysalis, the link or bridge between the earlier scientific practices and the more sophisticated modern empirical science that came just a few decades after his death. Of course, this is not to say that we can use a serrated knife to cut the dark night of the preceding science and the long dawn of modern empirical science which has often been placed at the wake of seventeenth and eighteenth centuries.

I have always sustained a continuity thesis in the evolutionary dynamics of science from antiquity to contemporary times. It is enlightening to say that, Paracelsus was purely a man ahead of his time. He was indeed a man of great scientific foresight and ingenuity to have offered what many may interpret as a primitive idea of external human intervention in the generation/procreation of babies. What he said regarding the "production" of a baby from only a male sperm appeared counter-intuitive to the scientists of his age. But the 21st Century bio-medical research bears him out in a very significant way and puts him conspicuously in the annals of medical sciences. Babies can now be produced from only male sperm or what Paracelsus calls homunculus without the aid of any female ovum. At best, the sperm is inserted into an artificial vat of nutrient and gestation will still take place if all other things are kept equal and neglected (*Ceteris paribus et neglectis*).

Given this Paracelsian ambition, a lot can be learnt in the direction of re-humanization of the African who is still very much enslaved under the shackles of religion. Instead of the childless African wallowing in a state of utter desperation and hopelessness, he can always align himself to the deep vision of Paracelsus that ties-in-well with the in-vitro fertilization technology of our time.

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