Beyond Theology into Biological Sciences?
Historical Discourse on the Concept of Determinism

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Abstract
The concept of ‘determinism’ has been one of the most debated concepts theologically and philosophically since the dawn of humanity. It has been associated with the question of the mechanism running behind the universe as well as with the question of divine powers and place and power of human wisdom in this universe. The paper analyses the historical evolution of the concept with a special emphasis on the emergence of modern scientific method of finding scientific laws behind the nature of universe. It concludes that modern science especially Biology and Genetics are constructing a more strong idea of determinism than what theology has been propagating, limiting the scope of chance and accident.

Keywords: Determinism; Beyond Theology; Chance; Accident; Probability; Philosophy Historical Discourse.

I. Introduction
This paper aims to comprehend some conceptual and philosophical foundations of the concept of determinism working behind the most recent scientific, intellectual and socio-political developments. The place of man in this system of Universe is one of the most popular questions for human mind since the emergence of human species. This question forms the foundation not only of human will to understand the nature of human action and activity but also of existence and functioning of this universe. Theology of universal religions has always propagated a perfect sort of determinism to confirm the all powerful concept of Divinity or Ultimate Reality and divinity-bound nature of human existence in this universe. Modern science has also propagating a sort of universal system of natural laws working behind what is happening in this universe. Yet, two concepts and claims are contesting each other since centuries. To explore this discourse, the paper focuses on what is the concept of determinism and how it evolved through the times; conceding human curiosity as a key to the formation of epistemology. It concentrates on the theme---what is happening around us is the very central question for human mind. This question generates the ideas of relationship of human beings with what is around in the environment and phenomena. It looks into human capacity and quality to influence the phenomena and impact of phenomena on the human sense of perception. This nature

1 The theological and philosophical works on Phenomenology are focused on this idea. See for example, the works of Hegel.
of human understanding at philosophical level raises the question of human free will and human fate.

To understand the issue, the paper examines the definitional aspect of the concept of determinism along with its historical presence in philosophical debate through the concepts of accident, chance, fate, human free will, etc. However, the concept of determinism’s changing scope is being focused in its relation with the changing paradigms of knowledge and intellectual developments in the backdrop of the relationship between the concept of natural laws and the concept of determinism. In this context, the concept of determinism becomes nucleus for most recent theological, biological and genealogical discourses and discoveries, beyond reasonless theology.

II. Definitional aspects of the concept of determinism

Determinism is a very complex term, used in very paradoxical meaning in almost all disciplines of knowledge. The term has been used since the dawn of philosophy to explore the complexities of human understanding regarding the process of evolution. To understand the concept of determinism, it seems necessary to look into the etymology of the term and meaning of the concept of determinism.

A. Etymology of Determinism

The traces of the term determinism can be found in the late fourteenth century European theology. The English term of ‘determinism’ is usually elaborated through three roots; Latin ‘determinus’ and ‘determinare’; French ‘déterminisme’; and German ‘Determinismus’. Until the 19th century, the term “determinism” had been used by theologians and the philosophers as a unilateral view that reason or determining force of each act and every cause is God alone. (Lockyer, 2004) By 1846, due to Sir William Hamilton’s approach, the concept of determinism began to attract the attention of the intellectuals outside the circles of theologians. He defined “determinism” as two schemes of necessity, ‘the Necessitation by efficient’ and ‘the Necessitation by final causes’. Hamilton explained ‘the necessitation by efficient’ as brute or blind Fate and ‘the necessitation by final cause’ as Rational Determinism. (Barfoot, 1982) However, it was William James who gave the term a modern philosophical outlook through his lecture The Dilemma of Determinism delivered and published in 1884. In his lecture, William James presented a two stage model of freewill and explained it through the terms of "soft determinism" and "hard determinism". (James, 2005) With the passage of time, the term determinism was explored with a variety of meanings, which will be discussed, in the following part.

B. Definitions and Meanings of Determinism

The term determinism is being used in very innovative meaning in almost all disciplines of knowledge. Every field of knowledge has its own connotative explanation of the term. In A New Dictionary of Christian Theology, the term theological determinism is defined as ‘necessary consequence of the sovereignty of God’. (Richardson, 2002) However in the Dictionary of Philosophy (Runnes, 2006) the term determinism is defined in more scientific way:

The doctrine that every fact in the universe is guided entirely by law. The doctrine that all the facts in the physical universe, and hence also in human history, are absolutely dependent upon and conditioned by their causes.
Similarly in *Dictionary of Philosophical Terms and Names*, the term is presented as a methodology based on the “Belief that, since each momentary state of the world entails all of its future states, it must be possible (in principle) to offer a casual explanation for everything that happens”. (*A Dictionary of Philosophical Terms, 2011*)

Almost same sort of definition can be found in *Oxford Dictionary* as “The doctrine that all events, including human action, are ultimately determined by causes regarded as external to the will”. (*Oxford Dictionary, 2011*)

The *American Heritage Medical Dictionary*, explores the term with reference to evolutionary process, “that every event, act, and decision is the inevitable consequence of antecedents, such as genetic and environmental influences, that are independent of the human will”. (*The American Heritage Medical Dictionary, 1997*)

Encyclopedia Britannica considers it as a theory to “preclude free will”. (*Encyclopedia Britannica, 1989*)

*The Great Soviet Encyclopedia* explains determinism as “a philosophical doctrine maintaining the objective law-governed interdependence and interconditionality of the phenomena of the material and spiritual world”. (*The Great Soviet Encyclopedia, 2010*)

One can observe that except theological definition of the term “determinism” where cause of every action is associated with divinity, rest of the definitions and explanations have quite common grounds on the basis of casual relationship. However it is presented in different perspectives of “doctrine”, “belief”, “theory,” and “methodology”. All definitions carry commonality to the extent that these agree that each current event is associated with prior and posterior event[s].

### C. Types of Determinism

J. R. Lucas presents a four level understanding of the concept; these are: logical determinism, theological determinism, psychological determinism, and physical determinism. (*Lucas, 1970*) Logical determinism maintains that the future of universe is already fixed as the past. Theological determinism believes that since God is omniscient, He knows and makes everything, either in past, in present or in the future. Psychological determinism maintains that there are certain psychological laws, enabling us to predict, usually on the basis of experiences that determine that how a man responds to different situations throughout his later life. Physical determinism is based on there being physical laws of nature, many of which have actually been discovered, and of whom truth we can reasonably be certain, together with the claim that all other features of the world are dependent on physical factors. (Ibid)

In this context, the idea of determinism seems an intellectual effort, through two major perspectives: Understanding physical phenomena and understanding morality and ethics. The philosophers while separating themselves from ‘theosophy’ try to understand physical phenomena of happenings. It aims to perceive how things actually are developed or formed. This quest for knowledge found its stage in the concept of determinism that further helped to understand a multi-dimensional world of nature. Simultaneously, when philosophers observe human being and his actions without considering the will of supernatural; they come across with the problem of accountability.

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2 Historical determinism also comes into this category.

3 Environmental and Biological determinism is part of this category.

4 Philosophers of time had to answer these questions to convince people on rationality and natural phenomena against mythology, according to which everything was being settled by gods.
As if supernatural is not directing the actions of human beings or not providing reward/punishment of human action then how to fix responsibility of human actions. This part of intellectual problem nourished the concepts of “MORALITY” & “ETHICS”. It was also linked with the question of human free will.\(^5\)

These two perspectives support the probability that there are some certain laws, which accomplish the certain results. However, there is a lot to be explored about the faculty of certainty in human intellect; this exploration can open new fields of knowledge and can change understanding of determinism.

III. Theological Concept of Determinism

Theological concept of determinism is associated with the concepts of God. Where, it’s the God who always decides, creates, initiates, moves as well as accelerate each action and thought in whole Universe. Through Omni determining powers, God holds position of Supreme Being. In fact, almost all theological tradition is based on this concept of determinism. Theological Concept of determinism led the foundation of Theological Epistemology as well. Where God not only is the creator but being a creator He also all knows. He has the knowledge of everything as he himself has created everything in past and whatever will be happening in future will also be dependent upon His majestic power of doing and wisdom. As Paul Helm describe God’s providence as extended to all that He has created.(Paul Helm, 1993) This determinism based theological epistemology defines God as cause of everything: an independent cause which does not need any other cause to operate. Derk Pereboom characterizes this view as the position that God is the sufficient active cause of everything in creation, whether directly or by way of secondary causes. (Pereboom, 201, p.39) The divine causality is considered as predetermining factor for determining all choices. Here choices are like of already written number of scripts where choice is to just select which script is to be used but having no choice to create new one, without intervention of deity. So choice also becomes pre-determined lettering available in God’s mind. Theological epistemology doesn’t let anyone go outside of paradigm of God’s wisdom and nothing is out of reach from His Omni potential position.

Theological concept of determinism and development of religions are interdependent; some religious traditions helped to develop theological concepts whereas some theological ideas helped to shape up religious traditions according to historical, environmental impacts. One can find these concepts in both extinct religions\(^6\) and surviving one.\(^7\) Even in much ancient times, when polytheism was mostly in practice\(^8\) all the gods were considered as determining factors of each happening. That can be considered as early rationality where human intellect became able to connect happenings with causes through their ability to imagine and symbolize. Later on with evolution in

\(^5\) Study suggests that Philosophers were keener towards freewill as at initial phase they were struggling to come out of clutches of Mythology.

\(^6\) By Extinct religions, I mean religions whose practitioners are no more available in good numbers and we are familiar with these due to its surviving literature (oral and written) only

\(^7\) Surviving religions are Judaism, Christianity, Buddhism, Islam and Hinduism

\(^8\) Personally I am of the view that even within polytheism concept of monotheism was strongly engraved. As name any polytheistic concept there was always one god who was considered as leader or supreme to others like Zeus in Greek, Shiva in Hindus and some portions of the world Sun itself remained a sole deity for worship as human beings was considering sun as life giver.
human intellect, God introduced more refined religions. Most of these religions differ from each other in practices but introduction of God as Omni determining is almost same. This power (Omni determining) is presented through God’s wisdom and knowledge, God’s power to create, change, and manipulate and theological description that how He did it. These religious traditions particularly present God as Creator and having knowledge of everything. Following are few examples from basic texts of some surviving religions presenting two particular Omni-determining powers of God---Creation & Knowledge. In the Muslim scripture Al-Quran, Sura Talaq and Hajj, God’s Omni-determinism id presented as:

*God is the One who created seven heavens and of the earth a similar number. The Command descends among them so that you know that God has power over all things and comprehend all things in His knowledge.* (Al-Talaq, 12)

*Don’t you know that ALLAH Knows what is in the heaven and the earth, indeed it is all in a record, and that is easy for ALLAH".* Al-Hajj, 70)

In the Hindu scripture Bhagavad Gita, the concept is defined as:

*I am the source of all spiritual and material worlds. Everything emanates from Me. The wise who perfectly know this engage in My devotional service and worship Me with all their heart.* (Bhagavad Gita, 10.8)

*Everywhere is His hands and legs, His eyes, heads and faces, and He have ears everywhere. In this way the Super soul exists, pervading everything* (Bhagavad Gita, 13.14)

Christian scripture presents the belief as:

*In the beginning, God created the heavens and the earth.* (Bible, Genesis, 1.1)

*For by him all things were created, in heaven and on earth, visible and invisible, whether thrones or dominions or rulers or authorities-all things were created through him and for him.* (Bible, Colossians, 1.16)

*Great is our Lord and mighty in power his understanding has no limit.* (Bible, Psalm, 147.5)

One can easily observe that theological concept of determinism has greatly influenced human intellect and its understanding about “determinism” even in modern times, largely due to the fact that theological concepts and ideas acted as first major step

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9 I am not in agreement with famous argument of some thinkers that concept of god like of customs and practices. I think God always had a very wise plan; He did not send anything for which human intellect is yet not prepared to comprehend. God let historical events happen in a pattern and as soon human intellect comes to a stage; a religion through a person (commonly through any prophet or sometimes through a saint) was sent so that intellect can grasp it. Like there is a Quranic Verse “and there is not a thing but it’s (sources) treasures (inexhaustible) are with Us, but We only send down thereof in due and ascertainable measures” [AL Hijr, Verse # 21]. So customs and practices evolve not the concept.
for the beginning of the human intellectual journey. Therefore, equation of Human Intellectual evolution can:

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\text{Mythology} + \text{Theology} + \text{Theosophy} \leftrightarrow \text{Philosophy} \leftrightarrow \text{Social Science} \leftrightarrow \text{Science} \leftrightarrow \text{Technology}.
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And ironically like one cannot delete basic pair of 46 chromosomes from a person since its conception even after getting a shape of more than 5 feet person. Likewise even that human intellect has passed its thousands years old journey from theology to Technology; it still has two basic concepts in it, embedded since the time of Theology; these are concepts of singularity and certainty. Physics is considered as “Zeus for all Sciences” is dependent upon certain (fix) physical laws. Aristotle founded Physics on the consideration of unchanging laws, Isaac Newton connected earth with heavens through his Calculus but himself admitted that his basic source came out of his experience of repeated recitation of Bible for three consecutive years; ended on providing basic laws of Physics. He convinced the world on “certainty,” Einstein proved it through his general theory of relativity and Hubble presented it through his theory of expanding Universe. Similarly, like once theology approached the idea of God as singular being who is the creator and sustainer of the worlds; even after thousands of years today’s man’s most favorite endeavor is to Higgs Boson. (Carena, 2013, p.3) Commonly known as God’s particle for which modern scientists consider a starting point of everything.

Today’s world has reached far beyond the initial stage of theological concept about determinism; but even then can detach itself from the basic platform given by those concepts.

IV. Philosophical-Historical Discourse on the Nature of the Concept of Determinism

Two basic questions raised in human world of intellect have been “where I am? and “Who am I?” During the historical journey of millennia, humankind has passed through the landmarks of formation of myths as well as religions, philosophies, aesthetic and consequently civilizations. The first question opened the intellectual relationship between nature and man. (Kirk, 1957) However, the second question, “Who am I?” became more problematic concern of man in history. (Plato, 2012). The Greeks achieved a landmark in the understanding of these questions and also introduced method of investigation of such questions. While trying to find the “matter” of the Universe”, Leucippus and Democritus gave a theory that, “Everything is composed of fundamental and invariant atoms.(Kirk, 1957) Leucippus also provided the base of subject by presenting the theme that “nothing occurs at random, but everything for a reason and by necessity”.(Ibid) Such themes led human beings to evolve an understanding of relationships between two things and two incidents which became a foundation stone for the development of the concept of determinism. In this context, the concept of determinism seems to be emerging by the birth of Philosophy and epistemology.\(^{10}\) It developed a belief that every event or state of affairs, including every human decision and action is the inevitable and necessary consequence of antecedent states of affairs. Initially the Greeks failed to found a room for “chance” as Leucippus claimed that,

\(^{10}\) While stating so I am keen to present that Knowledge begun with desire for “knowing” and got structured while getting knowledge of “reason” behind the occurrence of events and incidents.
“Nothing occurs at random”. (Ibid) Although the concept provides freedom from mythological gods, yet, it makes human intellect salve of natural phenomena.

Generally, the Greek philosophers attached an element of human freedom with material determinism and causal law, but Aristotle argued convincingly in favor of indeterminism was Aristotle. He explained:

It is obvious that there are principles and causes which are generable and destructible apart from the actual processes of generation and destruction; for if this is not true, everything will be of necessity: that is, if there must necessarily be some cause, other than accidental, of that which is generated and destroyed. Will this be, or not? Yes, if this happens; otherwise not. (Aristotle, 1981)

However Aristotle’s indeterminism introduces the concepts of “accidents” caused by “chance”. In his Physics, he reckons chance as a deviating factor among the chain of causes which he terms “fifth cause”. (Ibid) This was an uncaused or self-caused event that happens when two causal chains come together by accident. In the Metaphysics too Aristotle follows same stream of understanding. He believes that there is not any “definite cause for an accident, but only chance, namely an indefinite cause”.(Ibid) In the Nicomachean Ethics he links this idea with the nature of human action and explains that our actions can be voluntary and “up to us” so that we are responsible….Causes from which chance results might happen are indeterminate; hence, chance is obscure to human calculation and is a cause by accident”.(Ibid)

The development of the term or idea of “chance” by Aristotle provided an interesting twist in the debate on the nature of determinism. Chance creates a soft vacuum within the hard frontiers of determinism. That is how even after many discoveries by science in the different fields; the idea of freewill is still philosophically alive. For Aristotle, indeterminism is simply an occasional event without a cause. It means that one can have an adequate causality without ‘strict determinism’ or without complete predictability of events and the idea of only one possible future. On the other hand the concept of ‘adequate determinism’ provides statistical predictability, which in normal situations for physical objects. (Ibid)

As a theory to know the mechanisms of happening or functioning of the events and actions, the concept of determinism has remained one of the prime interests of the philosophers to resolving the ethical questions. Spinoza used an alternate term ‘contingent’ to delimit the scope of determinism in comparison with ‘chance’. However, for Spinoza, ‘there is nothing contingent, but all things have been determined from the necessity of the divine nature to exist and produce an effect in a certain way’. (Spinoza, 2001) For him, free will is a perceptional value, otherwise there is ‘no absolute or free will; but the mind is determined to wish this or that by a cause, which has also been determined by another cause, and this last by another cause, and so on to infinity. In this discourse, chance, probability and randomness appear to be opponent ingredients to deterministic values.

One school of philosophers maintains there are no non-trivial objective probabilities for events in our world. For, William James, distinguishes between “hard” and “soft” determinism. Soft Determinists believe that all events, including human
decisions, are determined, but some kind of freedom and moral responsibility also exists. Hard determinists believe that the determination of human decisions requires us to reject the concept of moral responsibility. However, soft determinism creates a space for some uncaused or self-caused human choices or ‘chances’. When we throw dice, we often say that the result is “by chance;” but we don’t mean that the result is uncaused, only that the causes are hard to ascertain or control. Laws of probability enable us to predict the results of such chances over the long term. (James, 2010)

Classical concept determinism moves around the concept of Causal Determinism with a belief that every event is necessitated by antecedent events and conditions together with the laws of nature. The events within a given paradigm are bound by causality in such a way that any state (of an object or event) is completely determined by prior states. Therefore, cause-effect relationship becomes a part and parcel of every happening. That is why determinism is more often taken simply as Causal Determinism. However, since the beginning of the concept, the philosophers failed to implement cause-effect relationships on a number of incidents, events and happenings. Yet, Philosophers were more conscious to not to allow any idea which once again may dump Philosophy into mythology or theosophical and the concepts of chance and accidents seem to had emerged with this background of intellectual discourse. During the early Greek period, the discourse appeared to be a watershed between causes and effects, especially in the works of Aristotle, but, eventually it developed a sort of skepticism about the concept of casual determinism. However, this Aristotelian Indeterminism formed a remarkable shift of arrangements through an alternate methodology in Avicenna’s logic. Avicenna, most of the times, agrees with Aristotle’s notion on chance but also gives a slight blend in the idea in a way that one gets liberation from hardness of causal determinism. For Avicenna: Chance is an accidental cause from among natural and voluntary things (amr), [which] does not necessitate always or for the most part, pertaining to that which is for the sake of something, and [it does] not have a cause which necessitates it essentially. (Belo, 2007) Through chance, Avicenna attacks on the “necessitate” part of casual determinism, but his rejection is not a mere pseudo-propositional, rather, he explains the process of chance in an innovative way. Avicenna takes chance as a happening which exists in the situation in which an agent acts with a view of a specific outcome and the outcome of the action is other than what he or she has expected. A chance happening is thus an action or event which has a goal and which leads to an unexpected result other than the purposed goal.

The chance element, therefore, is tied up with the expected outcome of an action, not with the essential causes of that action. For, an action always has an essential cause according to Avicenna, and hence this would not be a criterion for classifying chance events. Same sort of understanding Avicenna affirms in his al-Shifâ as ‘an accidental end ( ghâya) of a natural or voluntary process (amr), or even of a forced event’. (Ibid) However, in his book ‘al-’Ta bi’iyâyat and ‘Danishnâmah Ilâhiyyât’, he very successfully differentiates between Chance and accident:

Chance is attached to the final cause, not to the efficient cause, since chance is an end but not the one which was intended. The efficient cause is in any case determined, and chance appears to have the stronger link with the final cause. ........the efficient (and also the final) cause is threefold: natural, voluntary or accidental. (Ibid)
Avicenna further demarcates between chance and accident by through explaining accident as a typical entity ‘which exists in something without being a part of it, the subsistence (qiwàm) of which is not true without that in which it is’. (Ibid) An accident does not exist in isolation, but only through something else, a substance—or an event in the case of chance. However, ‘the substance is separate from the accident and its subsistence obtains without it’. (Ibid) Avicenna presented chance with that which happens spontaneously or coincidentally—as it has already been pointed out, the term ittīfâq literally means coincidence. In Aristotle’s philosophy cause means not only that which necessitates the effect but also, more broadly; causes, in particular the efficient cause, have a determining effect on what they produce, but they also at once provide the explanation for the existence of a given substance. The first meaning of causality is of the ontological order, because it involves the existence of the substance produced by the causes. The second meaning is of the epistemological order and concerns our understanding of a substance and its origin through its causes. Now what potentially differentiates Avicenna form Aristotle is insertion of the concept of God. He did so by defining chance conclusively, as chance is a coincidence generated by the clash of two different bodies or causal chains that can ultimately be traced back to God, the causer of all causes. In this context, Avicenna restored the deterministic value of Aristotelian chance and accident and created a space for what is considered the beginning of scientific determinism especially in health sciences.12

V. Scientific Revolution and the Concept of Determinism

Theories of chance and randomness (Webster, 2013) got new meanings during and after the series of scientific revolutions between 16th and 19th centuries. Since the Scientific Revolution, Chance and Randomness are made much closely related with each other as well as human ignorance. So much so, to say, an event happens by chance is close enough or synonymous in ordinary English with saying it happens randomly. ‘Scientists use chance, or randomness, to mean that when physical causes can result in any of several outcomes, we cannot predict what the outcome will be in any particular case. In this context, the space of chance and randomness was used by Charles Darwin in the nineteenth century. He successfully changed his contemporary world’s view on how things are interacted with each other and how environment and conditions apply in the development of species. Darwin reached to that position by catching the thin line between

11 For Avicenna the coincidence itself has a necessary cause
12 Aristotle earliest dissections and his interest in healing is well known. It heavily influenced persons like Galen who is considered as father of modern medicine. Initially besides trying to know the things around, his urge to understand the concept of healing compelled Aristotle to work for the understanding of relationship between cause and effect. In this context, the concept of healing might be taken as first ever challenge to compulsive or hard determinism. Results in healing might have urged Aristotle to take a leap into the world of free will. And that free will debate came through the channels of chance, change, accident and contingency.
13 Whenever, Intellectual History of Human beings will be written, Isaac Newton (1642 – 1727), Auguste Comte (1798 - 1857), Darwin (1809-1882) and Freud (1856 – 1939) have to be considered as Fathers of modern thought. Darwin came up with the whole new idea on how things actually develop within the frame of our own tangible world; Comte’s positivity gave birth to those subjects which gave us the courage as well as method to investigate, it was as important as once philosophers founded the human knowledge on philosophy rather to understand everything through theosophy. Without Newton’s concept of mechanical universe, laws of motion and calculus; space ships, rockets, computers, airplanes, information on gravity, knowledge of size of the Universe was impossible. Without Freud, possibility of turning poetic thoughts to tangible sciences was impossible, without Freud possibility of understanding human personality in real world was quite low. These 300 years made us what we are today. Fate of human intellect was written in this period.
determinism and indeterminism and that thin line was ‘chance’. Darwin's use of the word ‘chance’ in *The Origin of Species* is overwhelmingly to describe the chances of acquiring new characters and the chances of survival, and only rarely to the role of chance in the genetic variations that drive natural selection. He was reluctant to describe the details of genetic variation, perhaps because ascribing it simply to chance was scientifically unsatisfying for him. When he does come to connect chance to variation, he takes chance to be the result of human ignorance, leaving the door open to a better explanation in the future by the growth of knowledge. Darwin did not exactly and explicitly use the term Chance, rather, in his famous book, *‘Origin of Species’*, he was discussing the subject under variation and deviation. Darwin was of the view:

I have hitherto sometimes spoken as if the variations so common and multiform in organic beings under domestication, and in a lesser degree in those in a state of nature had been due to chance. This, of course, is a wholly incorrect expression, but it serves to acknowledge plainly our ignorance of the cause of each particular variation. Some authors believe it to be as much the function of the reproductive system to produce individual differences, or very slight deviations of structure, as to make the child like its parents. But the much greater variability, as well as the greater frequency of monstrosities, under domestication or cultivation, than under nature, leads me to believe that deviations of structure are in some way due to the nature of the conditions of life, to which the parents and their more remote ancestors have been exposed during several generations. (Darwin, 1997)

Like Avicenna, Darwin finds in his own way a delicate relationship between determinism and free will through chance. Although both are quite different as Avicenna eventually connects everything with God whereas Darwin once detached himself from any religious clutches never went back to it. Darwin thinks the fixed laws of nature are enough to explain the world in materialistic terms. No superior contriving being is required in this concept. However, the connection between free will and determinism was still there. For Darwin free will is connected with chance, but it is epistemic chance. It produces random new possibilities, but they are completely determined by natural laws. Darwin observes multiplicity of causes - hereditary, education, circumstances - that appear random and may not be known exactly. They show up as new organization in the individual.

Such an idea eventually gave birth to Compatibilism. Compatibilists argue that determinism is compatible with human freedom, and that indeterminism is not compatible or at best incoherent. This idea mainly got its recommendation in modern age through David Hume who through his two books (1) *Treatise of Human Nature* and (2) *Concerning Human Understanding*, advocated that freewill is compatible with physical determinism. But Hume’s technique to explain Compatibilism is unique. Under the influence of John Locke, it was not possible for Hume to embrace hard determinism as it losses his position as empiricist. Especially due to the idea of ‘tabula rasa’, it was not possible for him to accept pre-cause; so, Hume did not deny causation. But he did say that empirical methods could not prove it, as observations only show a ‘constant conjunction’ of events, a ‘regular succession’ of a followed by B, which leads the mind to the inference of cause and effect. Hume further elaborates this by redefining the concept of ‘necessity’ to describe the inference of the human mind that discovers causality in the regular succession of events, that postulates uniformity of nature to assume that the laws
of nature will continue tomorrow to be the same as today, and even to describe the assumption that we can predict future behaviors of an agent based on our observations of the agent’s habitual behaviors. That is why Hume holds idea of the nature of a person as what we can reliably predict the behaviors of someone based on their past behaviors, because their actions are normally determined by their character and motives. It is also worthy to note that both rationalists and empiricists reach to ‘necessity’ through “chance”, however first one believe in hard determinism and accept chance and the later one hardly believe to the level of soft determinism or Compatibilism and does not have faith in chance as what great atomist Leucippus believed that ‘nothing occurs at random, but everything for a reason and by necessity’. (Ref).

Rationalist and empiricist, both are agreeing on place of ‘necessity’ in this world of action and happenings. This element of change is not just the element of change but rather it’s a kind of switch between two worlds of matter and non-matter or a connecting wire between thought and happening.

VI. Impact of Biological Sciences on the concept of Determinism

Even during Greek classic period, there were some ideas which demanded practical representation of “communicable determining factors.” This effort laid foundations of empirical investigation; which later led science to develop scientific evidence for its all discourses. Among very first subjects who were evolved in result of empirical investigation was biology. The subject of biology also opened many new aspects of investigation, resulting conversion of ideas into demonstrative scientific evidence. Through biology early philosophers became successful to practically present that a result is actually outcome of determining factors, same thought eventually gave birth to develop idea of natural laws. Aristotle is considered as one of the founding fathers of the subject. Even before Aristotle, many Greek philosophers speculated about origin of life but it was Aristotle who first time used empirical investigation in support of his ideas; and he did so by doing dissections of animals. That is why, his observations on shark and catfish were even confirmed by 19th century scientists. It was his investigative method which made him successful to present classification of animals.

During scientific revolution, all thoughts which cannot come under the microscope of empirical investigation were removed. All kind of speculations related with concepts of chance and accidents under the impression of theistic and religious doctrines were removed. Human mind was keener to explore reasons behind chance and accident. Chance was no more a mere chance but it was taken as mechanics which is yet not explored rather to previous practice through which chance was associated with some divine command. During this period subject of biology helped a lot to discover determining factors of happenings. Historically, biology is divided in four periods/parts 4th part is known as modern era which took place from 16th to 19th century. During this period Andreas Vesalius’ (1543) book on “The structure of the Human body,” William Harvey’s (1628) discovery of mechanics of human blood circulation, Robert Hooke’s (1665) discovery of cell, Charles Darwin’s (1859) Theory of evolution through natural selection practically demonstrated efficacy of scientific method. As well as one can easily judge, that all these scientific outcomes were outcome due to quest to know the

\[\text{An evidence is considered scientific evidence only when in a given circumstances same result is achieved repeatedly}\]
mechanics behind the happenings. Through these discoveries not all but some noumena about chance were translated into known phenomena. Human intellect got the liberty from unknown divine will and started to discover determining factors of world around. Biology while exploring what is life and how it works, introduced idea of natural laws. Law in scientific thought was introduced as “has to be” which replaced “ought to be”. During said period a direct conflict with divinity was avoided but a local mechanical network was introduced, according to which a thing tend to always due to certain law and that does not need an accelerator all the time. Said thought turned determining factors into natural laws and idea of mechanical universe was evolved; which was automatic due to certain laws although not considered autonomous. The idea of automation accepted chance as part of the game having its own unique logical grounds.

Scientific revolution taught human intellect to consider tangible and generalized aspects of reality. Said revolution pushed human thought to discover determining factors of every incident/event. One of early fields whom adapted this mind set was field of medicine; a new branch in biology which was trying to discover life. However, the subject of biology and its sub branch – medicine was not born during scientific revolution.

VII. Genetics and Determinism

Scientific method’s emphasis on the objective, universal and verifiable knowledge, especially, in human sciences and medicine led, by the mid twentieth century, to the exploration of universal codes of human body maintaining the individuality of human mind and body. One major step in such explorations was the discovery of DNA (Deoxyribonucleic acid) in 1953 by James Watson, Francis Crick, & Jaclyn McCarty as a molecule that encodes the genetic instructions used in the development and functioning of all known living organisms. Same encoded information when decodes itself in daughter cells, determines continuity as well as formation of life.

DNA is defined as a double helix thread program, run through genes. The Concept of gene is quite older than the discovery of DNA. In 18th century, Charles Darwin had used the term “gemmule” to describe a microscopic unit of inheritance. After him Gregory Mendel (1822–1884), did talk about “some source” through which biological variations are inherited from parent or grandparent to their children’s. It was Wilhelm Johannsem a Danish botanist who coined the term “gene” in 1909 to describe the fundamental physical and functional units of heredity among all living organism. Now Gene is defined as:

A specific sequence of nucleotides in DNA or RNA that is located usually on a chromosome and that is the functional unit of inheritance controlling the transmission and expression of one or more traits by specifying the structure of a particular

15 Ought to be, was used to be a theistic term. According to which due to divine command each event is being commanded through divine intervention
16 Definition of Biology - Greek words: bios - meaning “life” + logos - meaning “study of”, the science of life, the study of living things, deals with the investigation of the origin, history, structure, function, identification, classification, distribution, development, inheritance, and significance of living things as well as their relationships and interaction with the environment. ( “Introduction To Biology.” Accessed on 10 November, 2014, http://donabelmg.weebly.com/uploads/9/8/3/2/983224/introduction_to_biology.doc.)
polypeptide and especially a protein or controlling the function of other genetic material.(see supra reference)

With this perspective of the development of human sciences in 1972 Walter Feris with his team reached to the idea of gene sequencing; a process of determining the precise order of nucleotides within a DNA molecule. DNA sequencing provided the core basis of studies in evolutionary biology through which we study that how different organisms are related and how they evolved. This also started new era of molecular genetics which brought techniques for sequencing DNA which eventually made possible the human genome project in which all the DNA in a human has been sequenced. Now Genes are no more taken as a standalone rather it has been introduced as dynamic script which runs through gene expression. However this deterministic nature of Genes does not work out of environment that plays a significant role in the development of species. Genomes evolve as per environmental conditions and functions of genomes depends on the environment that determines that which set of genes are to be turned on and which will be kept off, hence determining organisms in their developments and functions.

These discoveries are as important as the ideas of “atom” by Democritus and of “gravity” by Newton. As through ideas of atom (as once considered most basic unit of matter) and gravity (considered as reason of development of Universe), scientists approached to believe in grand design of the Universe where physical laws govern as necessary determinants of all events/happenings. Mac Planck concludes this through stating that ‘we are integral parts of a universe which is subject to the rigid order of nature's laws’. Likewise an eventual discovery of DNA structure and concept of gene also encourages human intellect to believe that a huge Universe within human body is also the result of some specific laws and integrated chain of micro-life forms build larger life form – a human.

In the recent past idea of sociobiology has further elaborated concept of gene while explaining relationship between environment and gene. Sociobiology has introduced how nature and nurture act together to determine not only life but behavior as well. Sociobiology while believing that certain behaviors are often genetic and are subject to evolutionary processes has switched both biological and non-biological determinants on common thread on the function and change in genetic behavior.

In this context, the concept of gene is an outcome of efforts to know the fundamentals of life. Now we are introduced with the mechanism of gene which claims that it’s not just smallest unit of life but through its capacity to record instructions /memories and ability to guide future life through recorded information, also determines the nature of life. About 200 years ago, Darwin approached the concept of life by stating that all organisms are the products of descent and now by knowing Gene’s capacity as recorder, respondent and re-player we conclude that how nature determines behavior of life as well. Therefore Genetics works with determinism as a theory that genes (genotypes) together with environmental impacts cause traits (phenotype). Genetic Determinism advocates that we the human beings are genetically programmed specie; where genetics not only represents biological part of human personality but due to its core capacity to get influence and to influence according to the environment it also provides the basis of behavior as well.
VIII. Conclusion

The concept of Genetic Determinism invites Philosophy to resolve many old and pending philosophical questions as well as it opens some new avenues for research in philosophical questions. The concept of genetic determinism switches almost all forms of knowledge: science, Social Science, and Philosophy. It provides an opportunity for philosophy to reconstruct the concept of determinism as alterable mechanism; rather to approach the concept of determinism as a fixed fate. It also invites new opportunities in the exploration of human evolution and history, significantly expanding the discipline’s knowledge and raising new questions about where we come from and how we differ from one another and other primates. This concept can heavily impact current understanding about Philosophy of history; as DNA provides an important avenue into human history, along with the evidence of archaeology, linguistics, and folk narratives, for the simple reason that our genomes contain the signatures of our ancestors.

Genetic Determinism also invites Philosophy to reconstruct its understanding as well as definition about empirical and rational knowledge. As per concept of Genetic Determinism there can’t be a “tabula rasa” as we inherit instructions from our ancestors through our genes; however our genes also have the capacity to re-write according to new environmental/cultural impacts, as well. But the empirical knowledge does not start on birth; even at the time of birth the baby human being is full of instructions and information; received from ancestors who got those from their own ancestors and through their empirical knowledge as well. So knowledge through experience does exist but experience does not write on tabula rasa rather new life and its environment rewrites new experiences on previous codes.

Genetic Determinism can also profoundly impact Philosophy of Management, especially its issues related with human resource management. This concept invites us to think that a general training for developing special skill without considering genetic capabilities of subject resource cannot give required results.

Political Philosophy may have the thickest impact. As just few decades before, world was avoiding any biological base concept of determinism as it was always linked with concept of forced effort to developed class differentiation on the basis of race. But now this concept has so much to offer that it cannot be negated. Now political philosophers has to consider that they are trying to develop political theories not just for one generation but each person is representing generations as well multi-culture his/her forefathers has lived in. And most probably the same understanding will also cut down fear of racist thoughts as same idea also advocates that all races are common races; and each generation carry the codes of multi-cultures its past generations has lived in. Proper investigation and promotion of this idea will not only help to develop better administrative structures of state as well as can lead towards peace among different communities.

Largely, Concept of Genetic determinism provides an opportunity for Philosophy to revive itself through participating positively in this intellectual evolution.

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