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A Theological Analysis of Biological Determinism Claims in the Context of Epigenetics and Brain Plasticity

Biyolojik Determinizm İddialarına Epigenetik ve Beyin Plastisitesi Özelinde Teolojik bir Çözümleme

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Abstract

Several theoretical studies have investigated biological determinism. First, it leaves no room for divine intervention in the various spheres of human activity. Second, it asserts that heredity significantly influences human behavior. This notion emphasizes the idea that humans possess both freedom and wildness. According to biological determinism, behavior is predetermined by DNA, reducing physiological brain activity. Consequently, what is commonly perceived to be human freedom is illusory. If an individual's actions are not a result of their own will, the issue of justice arises from the rewards and punishments that God metes out in response to human behavior. To address the theological dilemmas posed by these assertions of biological determinism, we sought to ground human freedom, will, and responsibility within the framework of God's justice, by drawing on insights from epigenetics and brain plasticity. However, can recent developments in genetic science comprehensively elucidate human behavior, potentially revealing the freedom we once believed we possessed to be an illusion? Answering this question was one of the primary objectives of this study.

Keywords: Kalām, Biological Determinism, Human Freedom, Epigenetics, Brain Plasticity

Öz

Biyolojik determinizmin teolojik olarak birçok problemi de beraberinde getirmiştir. Bunlardan ilki Tanrı`ya herhangi bir etkinlik alanı bırakmamasıdır. İkincisi de insan davranışlarının meydana gelmesinde kalıtımın etkili olduğunu belirtmeleridir. Bu düşünce insanın özgür ve iradeli bir varlık olma tasavvurunu ortadan kaldırmaktadır. Çünkü biyolojik determinizme göre DNA`mız tarafından önceden belirlenen ve davranışlarımız, beynin fizyolojik aktivitesinden başka bir şey değildir. Dolayısıyla insan özgürlüğü dediğimiz şey aslında bir yanılsamadır. Şayet insanın sergilediği davranışlar onun iradesiyle gerçekleşmiyorsa, Tanrı`nın insan davranışlarına karşılık verdiği ceza ve mükâfat, adalet problemini doğuracaktır. Biyolojik determinizmin bu iddialarının teolojik açıdan ortaya çıkardığı problemlere karşılık, epigenetik ve beyin plastisitesini temel alarak insanın özgürlüğü, iradesi ve sorumluluğunu, Tanrı`nın adaleti perspektifinde temellendirmeye çalıştık. Bununla beraber, genetik bilimdeki yeni keşifler, daha önce sahip olduğumuzu düşündüğümüz özgürlüğü bir yanılsama olarak ortaya çıkarmada insan davranışını eksiksiz bir şekilde açıklar mı? Sorusunun cevap bulması, çalışmanın temel amaçları arasındadır.

Anahtar Kelimeler: Kelâm, Biyolojik Determinizm, İnsanın Özgürlüğü, Epigenetik, Beyin plastisitesi

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Introduction

Throughout history, one of the most debated and thought-provoking issues that has preoccupied humanity is the question of freedom and destiny. Nearly all theological paradigms have presented ideas on this subject. Theologians and clergy have attempted to provide explanations within the framework of their religious understanding. In this context, along with the understanding that humans are free, schools of thought have argued that they are partially free and not free. The issue of human freedom continued to be debated despite the technology that developed with a rationalist and positivist understanding of science after the Renaissance. However, the emergence of new knowledge about the biological and psychological nature of human beings after the 17th century led to differentiation in the methodological course of human freedom and destiny. Therefore, this metaphysical debate has acquired a biological and physical structure in the modern period, and has acquired ontological and epistemological differences.

Toward the end of the 20th century, the most important advances in humanity were made in the science of heredity. The concept of a gene has been defined, and it has been stated that the DNA sequence contains information that determines all the characteristics of an organism. Since the discovery of DNA, molecular biology, and genetics have been added to the paradigms of science. When the Human Genome Project was completed in 2001, it was understood that human traits and characteristics are influenced by their genes. According to this understanding, people's biological destiny is determined by their genes. Some believe that their lives are determined by their health, success, or happiness, which is encoded by their genes.[1] The discourse on "Our Genes are Our Destiny" has had a wide social impact in this century, leading to negative attitudes toward the future of human beings. Concerns arise from attitudes that are grounded in genetics. Conversely, an understanding of the genetic diversity and interactions between genes and the environment can foster positive and inclusive perspectives.[2] In studies conducted from the perspective of modern science in human biology, no definite conclusion has been reached regarding whether humans are free. According to modern scientific methods, scientists claim that human beings are not free, as are those who argue that they are. Although human freedom is a topic of discussion in the metaphysical field, we believe that it should be justified within the framework of the information provided by science. When we look at classical Islamic theology, particularly the science of kalām, we see that Muslim theologians (mutakallimūn) grounded

1 Dawkins, *Gen Bencildir*; İnan, *"Beyin Nedir?"den "Yaşam Nedir"e: Bir hayat serüveni Türker Kılıç*, 131-32; Kılıç, *Yeni Bilim: Bağlantısallık Yeni Kültür: Yaşamdaşlık*, 92.

2 İnan, "Genin Ötesine Geçmek", 77.

the relationship between God and the world in their existing understanding of science. In discussions on God and existence, they presented ideas against the rigid determinism of Greek atomism. Mutakallimūn both accepted the cause-and-effect relationship within the framework of their own the theory of atomism and grounded the relationship between God and the universe, according to substance/jawhar and accident/'arad concepts.[3] Despite these disagreements, they have generally constructed relationships between God and humans based on human will, power, freedom, and responsibility (taklīf), in terms of human actions. While defending God's omnipotence and omniscience in all aspects, they also emphasize that God is a just and wise being. Therefore, they accepted that they would reward and punish human beings for their free action. Mutakallimūn did not oppose the existing scientific understanding of time. In this context, justifying theology through modern science has been a methodological approach (daqīq al-kalām) used by scholars since early years.[4] In this context, we believe that establishing human freedom and the biological foundations of modern science will contribute to the discussions in the field of metaphysics. As the realm of human action is primarily physical and biological rather than metaphysical, it is worth emphasizing that describing such topics based on biological foundations is more convincing and acceptable. However, today's Islamic theologians in the field of kalām have not paid sufficient attention to modern science. When we look at the studies on genetics, epigenetics, and brain plasticity in the literature, they are generally approached from a biological and medical perspective. Although there have been introductory studies on the philosophy of epigenetics, our work is original in terms of its theoretical approach.

In this study, the claims of biological determinism made by modern science are viewed as contradicting human freedom and God's justice. As such, issues of human freedom and God's justice have been examined through the lens of human biology, which forms the basis of genetic determinism. From a biological perspective, this study aims to prevent the misapplication of biological claims that undermine the religious understanding of humans and humanity. Consequently, in response to the claims of biological determinism and the theological concerns they raise, we sought to establish a foundation for understanding human freedom, will, and responsibility, as well as God's justice, based on epigenetics and brain plasticity. We focused on epigenetics and brain plasticity because they are closely linked. Epigenetic mechanisms regulate brain plasticity and modulate the impact of our experiences on the brain. For example, environmental challenges and stress

3 Bulgen, "Al-Māturīdī and Atomism", 223-64.

4 Bulgen, "Science and Philosophy in the Classical Period of Kalām", 940.

can result in epigenetic changes that affect brain plasticity. Conversely, a rich and stimulating environment can enhance brain plasticity, thereby leading to epigenetic changes. The fact that our study was situated within the context of epigenetics and brain plasticity suggests that the two complement each other. Although more research is needed, this study represents an important step toward reconciling the perspectives of biology and theology. Overall, this study sheds light on the complex dynamics among human biology, freedom, and God's justice.

1. Biological Determinism and Theology

The belief that human characteristics, such as intelligence, behavior, and physical traits, are determined by genes is often referred to as genetic determinism, which is a form of biological determinism.[5] Biological determinism considers genes or DNA as physical agents, and places greater emphasis on their roles in human biology.[6] Genetic determinism can be classified into three types: strong, moderate, and weak. Each form had a different definition.[7] These definitions typically focus on one-to-one relationships among genes, proteins, functions, and traits.[8] In other words, genetic determinism is the belief that genes (genotypes) determine certain physical traits or behaviors, and is often referred to as the idea[9] that human existence, intelligence, behavior, development, health, disease, and physical characteristics are all determined by genes.[10]

5 Gericke vd., "Exploring Relationships Among Belief in Genetic Determinism, Genetics Knowledge, and Social Factors", 1226.

6 Güngör ve Erdem, "Genetik Determinizme Dair Kavramsal İnceleme", 663.

7 Resnik ve Vorhaus, "Genetic Modification and Genetic Determinism", 3.

8 Gericke vd., "Exploring Relationships Among Belief in Genetic Determinism, Genetics Knowledge, and Social Factors", 1223; Sarraf, Woodley Of Menie, ve Feltham, *Modernity and Cultural Decline*, 1; Ellison ve De Wet, "Biological Determinism", 1; Gericke vd., "Exploring Relationships Among Belief in Genetic Determinism, Genetics Knowledge, and Social Factors", 1225; Carroll vd., "A Cross-Disciplinary Survey of Beliefs About Human Nature, Culture, and Science", 6; Barış, *Umut ve Kaygı Arasında Genetik Müdahale*, 47.

9 Resnik ve Vorhaus, "Genetic Modification and Genetic Determinism", 11; Shafique ve Wyne, "Beyond Theology into Biological Sciences? Historical Discourse on the Concept of Determinism", 373.

10 Gericke vd., "Exploring Relationships Among Belief in Genetic Determinism, Genetics Knowledge, and Social Factors", 1226; De Melo-Martin, "Firing up the Nature/Nurture Controversy", 526; Güngör ve Erdem, "Genetik Determinizme Dair Kavramsal İnceleme", 663; Resnik ve Vorhaus, "Genetic Modification and Genetic Determinism", 11; Shafique ve Wyne, "Beyond Theology into Biological Sciences? Historical Discourse on the Concept of Determinism", 373.

Scientists who promote genetic determinism argue that a cause-and-effect relationship is necessary to explain the determinism of human behavior.[11] They assert that human life is based on a necessary cause-and-effect relationship and can be explained by biological processes, and that genes are the source of human nature, behavior, values, beliefs, emotions, gender identities, culture, and the human life cycle.[12] For example, early twentieth-century determinist Henry Goddard stated that "intelligence is the principal determinant of human behavior, which is conditioned by an innate nervous mechanism, and the degree of efficiency of this mechanism, and hence the level of intelligence or mental level of each individual, is determined by the type of chromosome that is assembled by the fusion of germ cells, which is hardly affected by subsequent influences, such as serious accidents that can destroy part of the mechanism." [13] In this view, genes alone are the source of the characteristics and behaviors of living organisms.[14]

Historically, determinism has been defended by many people. For the first time, determinism has been traced back to Greek philosophy. Democritus and his teacher, Leucippus, accepted that everything was the result of natural laws. In addition, a strong claim of determinism was found in Stoic Chrysippus. He defines fate as "the natural order of all things established from eternity, consisting of things that mutually follow each other in an unchangeable and indestructible context.[15] We can say that the deterministic approach to the world has a foundation in the social sciences, starting with Hobbes (1588-1679).[16] With the discovery of DNA and the contributions of many scientists, biological determinism has begun to be openly defended.[17] After Charles Darwin's (1809–1882) Origin of Species was published in 1859, biological determinism gained widespread support as social theory. German biologist Ernst Haeckel (1834-1919), a contemporary of Darwin and enthusiastic supporter of Darwinism in his own country, suggested that the gill-like slits in

11 Castéra ve Clément, "Teachers' Conceptions About the Genetic Determinism of Human Behaviour", 420; Soysal, *Gen Ötesi-İnsan Sonrası*, 265.

12 Carroll vd., "A Cross-Disciplinary Survey of Beliefs About Human Nature, Culture, and Science", 6; Muskavitch, "Genetic Determinism in the Post-Genomic Age", 6; Ryan, "A Thumb on the Scale", 7; Shafique ve Wyne, "Beyond Theology into Biological Sciences? Historical Discourse on the Concept of Determinism", 363; Gildersleeve ve Crowden, "Genetic Determinism and Place", 142; Kegel, *Epigenetik*, 44.

13 Ryan, "A Thumb on the Scale", 7.

14 Zwart, "Genetic Determinism", 1; Gildersleeve ve Crowden, "Genetic Determinism and Place", 142; Güngör ve Erdem, "Genetik Determinizme Dair Kavramsal İnceleme", 662.

15 Sutton, "Religion and the Failures of Determinism", 27.

16 Küçüksönmez, "Azınlık Raporu", 182.

17 Dahm, "Friedrich Miescher and the Discovery of Dna", 284.

human embryos represented the gills of ancestral adult fish.[18] Evolutionism has transformed the concept of human nature into a model, in which environmental pressure acts on random gene mutations and reproductive combinations.[19] Swiss-born naturalist Louis Agassiz (1807-1873) explicitly advocated genetic determinism, stating that "the brain of the has the incomplete brain structure of a seven-month-old baby in the white womb. English scientist Herbert Spencer (1820-1903) echoed this sentiment in 1895.[20]

An important step toward the framework of genetic determinism was taken by Weismann (1834-1914). Weismann argued that the inherited "determinants" are the factors in the "germ plasm," which we now recognize as "genes" encoded in " DNA."[21] Henry Goddard (1866-1957) saw intelligence only as a trait rigidly transmitted from generation to generation.[22] In the last 15 years, in the USA, the UK, and more recently, in Western Europe, biological determinist theories have become an important element in political and social struggles. The beginning of this new wave was marked by Arthur Jensen's article published in 1969. Jensen claimed that most of the differences in IQ test performance between blacks and whites were genetic in origin.[23] The Psychologist Richard Hernnstein openly supported genetic determinism and extended it to the working class.[24] In his book "The Gene is Selfish," Dawkins argued that we are machines created by our genes and therefore have certain qualities in our genes.[25] Behavioral geneticists, including these names and many others, generally do not support strong genetic determinism.[26] According to proponents of genetic determinism, the relationship between genes and the body is one-way, that is, changes in genes are reflected in the body, but changes in the body itself due to its past and environment are not reflected in genes. Genes control the body that carries them, but are not affected by changes that occur in the body during development.[27] They base this understanding

18 Ryan, "A Thumb on the Scale", 8.

19 Bandura, "Reconstrual of 'Free Will' From the Agentic Perspective of Social Cognitive Theory", 86.

20 Ryan, "A Thumb on the Scale", 8-9.

21 Muskavitch, "Genetic Determinism in the Post-Genomic Age", 2.

22 Ryan, "A Thumb on the Scale", 18.

23 Lewontin, "Biological Determinism", 153.

24 Lewontin, Rose, ve Kamin, *Not In Our Genes: Biology, Ideology, and Human Nature*, 19.

25 Meaney, "Nature, Nurture, and the Disunity of Knowledge", 51.

26 Newson, "The Nature and Significance of Behavioural Genetic Information", 98.

27 Soysal, *Gen Ötesi-İnsan Sonrası*, 105; Barış, *Umut ve Kaygı Arasında Genetik Müdahale*, 196-97.

scientifically on the process of protein synthesis. In this context, they assumed that protein synthesis was unidirectional. In other words, information is transferred unidirectionally and irreversibly from DNA to RNA and then to proteins. Because of the unidirectional view from genes to proteins, organisms are automatically considered to be the result of genes, which are their cause.[28] The image of genes as self-contained causal agents underlying all aspects of an organism's life implies that human life is controlled by its genes and that human destiny is determined by these genes.[29]

Biological and behavioral determinists, all scientists who advocate determinism when asked whether a man is free, would answer no. We may have illusions of freedom, but they argue that our choices are programmed by our genes or infantile upbringing. In Dawkins' words, we are "big robots" containing genes, and these genes "control us in body and mind." Even the illusion of freedom is programmed into us by evolution because illusions are adaptive.[30] Schopenhauer's thought "we are free to do what we want, but we are not free to want to do it," expressed in his work The Voluntary Freedom of Man, comes to the fore again.[31]

If the claim of biological determinism is accepted as true, many theological problems arise. The first of these is human freedom. As mentioned above, if our behavior is based on the necessary cause-and-effect relationships between genes or neurobiological processes, we cannot claim that humans are free. In addition, it raises issues related to human responsibility and accountability. Theoretically, humans are considered responsible for all their actions. In return for this responsibility, God holds them accountable for the reward or punishment. If human behavior does not occur according to one's own will, the punishment and reward that God bestows upon human actions will become a problem of justice. Ultimately, do new discoveries in genetic science explain human behavior so completely that the freedom we previously thought we had was revealed as an illusion? Do genes determine everything about us? Should we succumb to fatalism if we believe that everything lies within our genes? Alternatively, should we seek the force of will

28 Kegel, *Epigenetik*, 63; Soysal, *Gen Ötesi-İnsan Sonrası*, 85; Barış, *Umut ve Kaygı Arasında Genetik Müdahale*, 43.

29 Smith, ve Burns, "Genetic Determinism or Genetic Discrimination?", 35; Muskavitch, "Genetic Determinism in the Post-Genomic Age", 1; Barış, *Umut ve Kaygı Arasında Genetik Müdahale*, 47; Soysal, *Gen Ötesi-İnsan Sonrası*, 88-89.

30 Lewontin, Rose, ve Kamin, *Not In Our Genes: Biology, Ideology, and Human Nature*, 287.

31 Martucci, "At the Beginning Was the Evil: Biological Determinism and Destiny in Lombrosian Criminology", 53.

to use genetic knowledge to improve human conditions?[32] Producing theological answers to these and similar questions is crucial for the field of science and continuity of theological paradigms. Therefore, responding to these claims from the same perspective on human nature would build a solid foundation for theology. At this point, we will first analyze the claims of biological determinism within the framework of epigenetics, a rare field in modern biology.

2. Against Genetic Determinism: Epigenetics

The claims of genetic determinists regarding human actions have been criticized in many respects. One of the most important of these is that it ignores the "multiplicity of elements" that determines human destiny.[33] In genetic science studies, especially since 2016, it has been understood that there is a new coding system for genetic codes that reveals that genetic coding has far exceeded its limits and powers. Epigenetics is a novel research field.[34] In Greek, "epi-," which means above, upwards, briefly means changes made above genetics. This term was first coined by British embryologist Waddington in his 1940 book Organizers and Genes, in which he mentioned that environmental conditions can affect gene expression, and thus alter development.[35] This concept has been differently defined by several researchers. For example, Bird defined it as the structural adaptation of chromosomal regions to record, mark, or maintain an altered activity. This definition covers a wide range of epigenetic marks, from transient epigenetic marks, where the epigenetic mark determined by environmental stimuli may last only a few hours, to hereditary marks.[36] According to Waddington, epigenetics is the study of epigenesis, and how genotypes reveal phenotypes during development. Waddington used this term to encompass the activities of all developmental biologists who have studied how gene activity elicits phenotypes during development. However, developmental biologists rarely use this term to describe their field.[37] Arthur Riggs and colleagues defined epigenetics as "the study of mitotically and/or meiotically inheritable changes in gene function that cannot be explained by changes in DNA sequence". Although these definitions differ in certain respects, they are often combined as they point to a single phenomenon. Currently, epigenetics are defined as molecular factors and processes that affect the activity of genes that can be transferred to daughter cells by mitosis or meiosis,

32 Peters, *Playing God?*, 21.

33 Gildersleeve ve Crowden, "Genetic Determinism and Place", 145.

34 Kılıç, *Yeni Bilim: Bağlantısallık Yeni Kültür: Yaşamdaşlık*, 28.

35 İnan, "Genin Ötesine Geçmek", 77.

36 Peckham, "Epigenetics", 10.

37 Bird, "Perceptions of Epigenetics", 396.

which regulate genome activity without causing changes in the DNA sequence.[38] Based on these definitions, epigenetic theories have been proposed to explain the genetic determinism in historical processes. Epigenetic theory emphasizes that not only is the biological structure of a human being effective in his/her personality, behavior, intelligence, and physical characteristics.[39] In contrast, human behavior cannot be evaluated independently of time, space, and culture.[40]

The complex interactions and interdependence of genes and environments, a fundamental and often-overlooked fact in biology, undermine the idea that genotypes alone determine phenotypes.[41] Critics of biological explanations of human nature argue that biological explanations of human behavior or human disease are reductionist, that genes can only be understood as contributing causes, and that organisms constantly interact with their environments in complex ways.[42] Many authors, including Richard Lewontin, Steven Rose, and Leon Kamin, have written articles criticizing biological determinism.[43]

Epigenetics challenges the assumption that hereditary information is encoded solely or entirely in DNA sequences, leaving the possibility of other inheritance mechanisms open.[44] According to epigenetic understanding, DNA is only a blueprint and environmental signals affect the expression of proteins produced by DNA.[45] Therefore, epigenetic experiments have shown that backward flow is also possible and that changes in body cells can be transferred to subsequent generations. In particular, one-way irreversible information flowing from DNA to RNA and then to proteins, as claimed by genetic determinism, has lost its validity. Epigenetics has shown that the DNA–RNA– protein pathway can also be reversed. In other words, everything that changes the protein structure, action potential, and environmental factors can change DNA. This scientific knowledge not only frees man from being a prisoner of his gene structure but also gives him the power and freedom to influence even his DNA through his thoughts and creativity.[46]

38 Barış, *Umut ve Kaygı Arasında Genetik Müdahale*, 62-63; Kılıç, *Yeni Bilim: Bağlantısallık Yeni Kültür: Yaşamdaşlık*, 27-28.

39 Barış, *Umut ve Kaygı Arasında Genetik Müdahale*, 73.

40 İnan, "Genin Ötesine Geçmek", 81; Kegel, *Epigenetik*, 303; Barış, *Umut ve Kaygı Arasında Genetik Müdahale*, 83.

41 Resnik ve Vorhaus, "Genetic Modification and Genetic Determinism", 3.

42 De Melo-Martín, "Biological Explanations and Social Responsibility", 346.

43 Sarraf, Woodley Of Menie, ve Feltham, *Modernity and Cultural Decline*, 31.

44 Peckham, "Epigenetics", 9; Soysal, *Gen Ötesi-İnsan Sonrası*, 109.

45 Soysal, *Gen Ötesi-İnsan Sonrası*, 136-37.

46 Kılıç, *Yeni Bilim: Bağlantısallık Yeni Kültür: Yaşamdaşlık*, 92.

Even in cases in which the genes are identical, gene expression can be completely different. Even if hereditary genes remain unchanged, they can be altered. The physical environment has components such as climate and geography; living conditions arising from material and spiritual factors such as nutrition and access to love and affection; and all experiences covered by the components of inherited historical past, behavior, emotions, thoughts, and beliefs affect genetic expression, in other words, genetic destiny, to varying degrees. In this sense, the genetic destiny is flexible.[47] For example, identical twins share the same genotype, but differ in height, temperament, and other characteristics.[48] Even two identical individuals, who are perfect clones in all aspects, have different desires.[49] If phenotypic traits are predetermined by genotype, as claimed by genetic determinism, different numerical abilities, height measurements, and voice tones of many identical twins cannot be expected or explained.[50] However, their reactions to events, tastes, and habits also differ.[51] Therefore, understanding that human nature is shaped by gene– culture interactions rather than genetic coding seems to be much more accurate.[52] The state of an organism at any given moment depends on the genes carried by its cells and the environment in which they develop. Consistent generalizations cannot be made regarding the developmental patterns of the different genotypes in different environments. For example, one genotype may develop better at low temperatures than at other temperatures, or worse at other temperatures.[53] Recent research has also identified gene– environment interactions that predispose individuals to traits, such as emotional disorders or antisocial behavior. A large study identified individuals among young adults in New Zealand who had experienced several major stressors such as relationship breakdown or death in the family. If stressed individuals carry genetic variations in a protein that controls serotonin activity, then the risk of depression is much higher. Neither genes nor stress alone predispose individuals to depression. However, these two factors form a combination of factors that determine depression.[54]

47 Karaçay, *Mutlu Beyin*, 50-51; Soysal, *Gen Ötesi-İnsan Sonrası*, 307; Barış, *Umut ve Kaygı Arasında Genetik Müdahale*, 73; İnan, "Genin Ötesine Geçmek", 82.

48 Genotype can be defined as the inherited potential of an organism. For example, a person's potential to be tall is determined by their genotype. Phenotype is the expression of this potential, that is, being tall.

49 Myers, "Determined and Free", 32.

50 Kegel, *Epigenetik*, 215; Barış, *Umut ve Kaygı Arasında Genetik Müdahale*, 48-49.

51 Aydın, *Beyin Sizsiniz 2.0 Metaverse Beyinler Arası İnternet Dünya Beyin Ağı, Wbw*, 153.

52 Barış, *Umut ve Kaygı Arasında Genetik Müdahale*, 200.

53 Lewontin, Rose, ve Kamin, *Genlerimizden İbaret Değiliz*, 354-55.

54 Baer, Kaufman, ve Baumeister, *Are We Free?*, 36; Ridley, *Genom: Bir Türün Yirmi Üç Bölümlük Otobiyografisi*, 337.

Epigenetics fundamentally shape who we are by translating our experiences into gene expression profiles. If we want to improve or change ourselves, we should actively seek experiences that will help us to develop the way we want.[55] However, in some cases, individuals can change the characteristics inherited from their genes and the concept of free will emerge. Based on this concept, it has been shown that individuals can alter the activity of genes under the influence of environmental conditions. Therefore, a paradigm that opposes epigenetics to biological determinism is important for theological justification of human freedom and responsibility.

Even in cases in which the genes are identical, gene expression can be entirely different. Although inherited genes may remain unchanged, they can be altered. Environmental factors are categorized under the umbrella of the environment, such as climate and geography, along with the physical environment, as well as the material and spiritual conditions derived from factors such as nutrition and access to love and attention, hidden collective experiences of the inherited historical past, behavior, emotion, thought, and belief components in fluence, genetic expression, or genetic destiny to varying degrees. In this sense, the genetic destiny is flexible.[56] For example, although identical twins share the same genotype, their height, temperament, and other characteristics differ.[57] If phenotypic traits are predetermined by genotype, as claimed by genetic determinism, it is not expected that many identical twins will differ in their numerical abilities, stature, and tone of voice.[58] However, their reactions to events, tastes, and habits also differ.[59] Therefore, the understanding that human nature is shaped by gene– culture interactions rather than genetic coding seems much more accurate.[60] The state of an organism at any given moment depends on both the genes it carries within its cells, and the environment in which it develops. Consistent generalizations cannot be made regarding the developmental patterns of the different genotypes in different environments. For example, one genotype may develop better at low temperatures than at other temperatures, or worse at other temperatures.[61] From a theological perspective,

55 Peckham, "Epigenetics", 17.

56 Karaçay, *Mutlu Beyin*, 50-51; Arvas, "Kelâm'da Akıl Delili: Aklın Mahiyeti Bağlamında Natüralist- Antropolojik Tezlerin Eleştirisi", 147.

57 Genotype can be defined as the potential that organism inherits. For example, a person's potential to be tall is determined by his genotype. The phenotype is the expression of this potential, i.e., being tall.

58 Kegel, *Epigenetik*, 215; Barış, *Umut ve Kaygı Arasında Genetik Müdahale*, 48-49.

59 Aydın, *Beyin Sizsiniz 2.0 Metaverse Beyinler Arası İnternet Dünya Beyin Ağı, Wbw*, 153.

60 Barış, *Umut ve Kaygı Arasında Genetik Müdahale*, 200.

61 Lewontin, Rose, ve Kamin, *Genlerimizden İbaret Değiliz*, 354-55.

the opposing paradigm that epigenetics bring to biological determinism plays an important role in grounding human freedom and responsibility.

3. Against Neurophysiological Reductionism: Brain Plasticity

Plasticity was first conceptualized as a way of understanding the point of contact between cultural and social processes and individual biological brains. In this context, it was used to describe how the brain develops its own history and quality beyond genetic determination by modelling itself.[62] In contemporary neuroscience, plasticity has emerged as a fundamental concept, validated by advanced imaging techniques, and embraced by extensive clinical, experimental, and theoretical studies.[63] Malabou stated that there are two types of plasticity: positive and destructive plasticity. In positive plasticity, a constant balance is maintained between the capacity for change and ability to remain the same. Here, plasticity describes the continuous process of the destruction and repair of a stable form. By contrast, destructive plasticity does not lead to repair and leads to small and large deformations.[64]

The concept of plasticity has a long philosophical history.- from Goethe to Hegel, Nietzsche and Freud. In this history, plasticity constitutes the transformational continuum between nature and history or between the body and soul.[65] The origins of the concept can be traced back to Ralph Cudworth's concept of "plastic nature" or to early modern theories of the peculiar material properties of the flexible nervous system. [66] The term plasticity was first applied to behavior by William James in 1890 in his Principles of Psychology. The first person to use the term neural plasticity is thought to be Polish neuroscientist Jerzy Konorski. Santiago Ramón y Cajal, the father of neuroscience, used the term neuronal plasticity to describe non-pathological changes in the structure of adult brains. According to the famous Neuron Doctrine, Cajal first defined neurons as basic units of the nervous system. This definition provides an important basis for developing the concept of neural plasticity. Many neuroscientists have used the term plasticity to describe the regenerative capacity of the peripheral nervous system, and Cajal's conceptual transfer of the term has led to contentious debate.[67]

62 Bates, "Unstable Brains and Ordered Societies", 117-18.

63 Bates, 117.

64 Tuinen, "Plasticity", 232.

65 Tuinen, 229.

66 Bates, "Unstable Brains and Ordered Societies", 118.

67 Azmitia, "Cajal and Brain Plasticity", 396.

Neurobiology, which began its rapid rise in the 1980s and continues to gain prominence, has become one of the most promising and extensively explored disciplines since the beginning of the 21st century. Until about 20 years ago, when neuroscience was still relatively unknown, biologists claimed that human behavior was solely driven by hormones, genes, and synapses, and that the influence of free will was weak. As a result, a prevailing belief emerged that everyone is born with a certain brain, and that these brains remain fixed and unchangeable.[68] This belief posits that the human brain is a sophisticated machine that regulates input– output processes and that all human emotions, thoughts, and behaviors are rooted in the neurobiological structure of the brain.[69] The Western world explains individuals' abilities, professions, achievements, and failures within the context of this fixed brain system.[70]

The idea that our behavior is caused by the physiological activity of the brain is theologically problematic because it refutes the traditional view of free will. [71] According to this idea, actions that are believed to be driven by free will are nothing more than electrochemical brain processes. As every event in the chain of biochemical reactions depends on the previous event, it has been argued that humans are not free.[72] However, the results of their study provide strong evidence that the human brain is far from complete during early childhood. Contrary to neurobiological determinism, it has been discovered that humans do not live in a deterministic universe and that the brain is not static–that is, unchanging, as previously thought–but has a changeable structure and plasticity. Brain structure constantly changes in response to an unexpectedly wide range of experiential factors. The plasticity observed throughout the brain emphasizes that it is a highly adaptable and developmentally learning organ.[73] The distinct organization of various regions of the cortex is not predetermined by genetics; instead, it can be shaped by acquiring data and experience.[74] Neuroplasticity studies have demonstrated that any type of mapped continuous activity, including physical and sensory activities, learning, thinking, and imagination, can alter the mind and the brain.[75] Our brains continuously shape themselves in a unique and individual manner through their

68 Boaler, *Sınırsız Zihin*, 26; Doidge, *Kendini Değistiren Beyin*, 12-13.

69 Ödemiş, "Determinizmin Yeni Savunması", 32.

70 Boaler, *Sınırsız Zihin*, 39.

71 Ödemiş, "Determinizmin Yeni Savunması", 42.

72 Soysal, *Gen Ötesi-İnsan Sonrası*, 247-50.

73 Doidge, *Kendini Değistiren Beyin*, 101.

74 Winston, *Evrenin En Karmaşık ve Gizemli Nesnesi İnsan Beyni*, 113.

75 Muskavitch, "Genetic Determinism in the Post-Genomic Age", 19.

lived experience. Cultural activities such as reading, receiving music education, and learning a new language have contributed to this change. Reading a single sentence can lead to the formation of new connections in the brain, thereby causing changes.[76] When we draw conclusions from this information, we can say that our social lives can change and transform our mental structures.[77] Preferences are motivational passions that should not be confused with behavioral choices based on reflexes or automatism. The detailed circuitry in the human brain is not pre-programmed; instead, genes provide highly general instructions for the organization of neural networks, and fine-tuning of these networks is achieved through experience.[78] Therefore, who we truly are is not predetermined, fixed, or a specific "thing."[79]

The discovery of neuroplasticity, which demonstrates that our brains can change, can be considered one of the most valuable findings of the past decade.[80] For example, when people learn new motor skills such as playing an instrument, plastic changes occur in the structure of the nervous system cells underlying motor skills. It is shaped by cultural activities, such as reading, studying music, or learning a new language. Even the sentences that we read can cause changes in the brain by creating new connections.[81]

The basic assumption of brain and behavior plasticity studies is that if behavior is changing, there must be some change in the organization or properties of the neural circuits that produce that behavior.[82] Our brains, and therefore, our mindsets, can change and transform our biological and social lives.[83] All of these findings show a dramatic impact of the environment on brain plasticity.[84] The discovery of neuroplasticity, which reveals changes in the brain, can be considered as the most valuable data in the current decade.[85] The description of human behavior as a flexible and variable connection network in the brain has brought about a

76 Kılıç, *Yeni Bilim: Bağlantısallık Yeni Kültür: Yaşamdaşlık*, 105; Doidge, *Kendini Değiştiren Beyin*, 293-94; Malabou, *Beynimizle Ne Yapmalıyız?*, 39.

77 İnan, *"Beyin Nedir?"den "Yaşam Nedir"e: Bir hayat serüveni Türker Kılıç*, 153.

78 Eagleman, *Beyin: Senin Hikayen*, 10.

79 Ödemiş, "Determinizmin Yeni Savunması", 43.

80 Muskavitch, "Genetic Determinism in the Post-Genomic Age", 19.

81 Kılıç, *Yeni Bilim: Bağlantısallık Yeni Kültür: Yaşamdaşlık*, 105; Doidge, *Kendini Değiştiren Beyin*, 293-94; Malabou, *Beynimizle Ne Yapmalıyız?*, 39.

82 Kolb, Gibb, ve Robinson, "Brain Plasticity and Behavior", 1.

83 İnan, *"Beyin Nedir?"den "Yaşam Nedir"e: Bir hayat serüveni Türker Kılıç*, 153.

84 Baroncelli vd., "Nurturing Brain Plasticity", 1099.

85 Boaler, *Sınırsız Zihin*, 12.

real theoretical and epistemological revolution.[86] At the same time, it is seen as the key to our future, as it opens the doors necessary to adapt to our equipment.[87] The fact that the brain is "plastic" throughout life, not fixed after a critical period, as assumed by Weisel and Hubel, is now increasingly recognized as the key to understanding its many functions.[88]

Consequently, the human brain changes its form tirelessly, and constantly rebuilds its circuit system. As the brain continues to change throughout life, a person's identity, personality, beliefs, and behavior are similar to those of a moving target with no final destination.[89] Good or bad mental imprints can lead to such habits. If we develop a bad posture or good behavior, they will also become permanent. This situation and variability manifests itself in the whole of human life. This means that one's personality as an adult was neither fixed nor unchanged.[90] The brain continues to change even in adulthood.[91] This variable structure of the brain, called neuroplasticity, provides a new perspective on the issues of human freedom and responsibility.

4. God's Justice and the Biological Basis of Human Freedom: Epigenetics and Brain Plasticity

There have been two opposing views in the history of thought: the idea that human beings are free in their actions and choose every action of their own free will, and the determinist view that actions are caused by a biological process.[92] According to the determinist perspective, which is the subject of this study, all phenomena related to individuals and society arise from nature. Inequalities in society are considered to be related to the genetic makeup of individuals, and are seen as an inevitable outcome.[93] According to this viewpoint, in the context of genetic determinism, a person's fate is determined by their genes or neurobiological processes, and the individual cannot change this predetermined fate.[94]

86 Malabou, *Beynimizle Ne Yapmalıyız?*, 8-9.

87 Eagleman, *Beyin: Senin Hikayen*, 196.

88 Paterson, "Molyneux, Neuroplasticity, and Technologies of Sensory Substitution", 347.

89 Eagleman, *Beyin: Senin Hikayen*, 6.

90 Doidge, *Kendini Değistiren Beyin*, 217.

91 Eagleman, *Beyin: Senin Hikayen*, 21.

92 Ödemiş, "Determinizmin Yeni Savunması", 33; Baer, Kaufman, ve Baumeister, *Are We Free?*, 275.

93 Lewontin, Rose, ve Kamin, *Genlerimizden İbaret Değiliz*, 380.

94 Barış, *Umut ve Kaygı Arasında Genetik Müdahale*, 48.

The issue of human freedom in classical Islamic theology (kalām) has been addressed and discussed in a theological context. However, there is a general perception of Jahm b. Safwān (d. 128/745), who was accepted as one of the early theologians, has an approach that human beings do not have free will[95], and there are also approaches that he has a different thought. According to Seyithan Can, who wrote an independent work on the subject, al-Jahm's attribution of all his actions to Allah led to the perception that he had abolished the freedom of will. Can states that electrical activity, which is accepted in modern science as the initiator of human actions, is compatible with Jahm's idea that "God creates power." After the creation of power (electrical activity), humans cannot influence the process of an act. Electrical signals are generated in the brain during an individual's action. These signals are sent to the muscles through neurons in the motor area. After the signals are sent to the muscles, energy is generated for the muscle contraction. With this energy, the human muscle contracts and activates the skeletal system to which it is connected.[96] The scientific information provided reveals that man has no influence on the stages at which he creates an act. Therefore, Jahm's idea that "might be created by Allah is compatible with scientific data.[97]

There is no disagreement among Mu'tazila scholars regarding the point at which humans are considered free. Humans possess created, active, and free will. When performing an action, humans utilize their power according to their will, thereby necessarily knowing themselves as being with free will.[98] Everyone who has reason recognizes that when he desires action, he is inclined toward it and that he himself determines whether he desires the action. He distinguished between wanting and non-wanting actions. Therefore, because a man performs his actions without any external influence to make them difficult, he is responsible.

al-Ashʿarī (d. 324/935), the founder of another important school of theology, places God's absoluteness at the center of the occurrence of action. According to him, because of his absoluteness, Allah encompasses all the aspects of his creation.[99] Although the Ashʿarites do not seem to have space for human beings within the framework of absoluteness, they attempt to justify human responsibility through the concept of *kasb*/acquisition.[100]

95 İrfan Abdülhamit, "Cebriyye", 205-8.

96 Guyton ve Hall, *Tıbbi fizyoloji*, 73 vd.; Can, "Modern Anatomi", 578 vd.

97 Can, *Cehm b. Safvân ve Teolojik Paradigmasını Anlamak*, 141-42.

98 Kâdî Abdülcebbâr, *el-Muğnî fî ebvâbi't-tevhîd ve'l-adl*, 6/2:8.

99 Eşʿarî, *Kitabu'l-luma' fi'r-reddi alâ ehli'z-zeygi ve'l-bida'*, 47.

100 Bakıllâni, *el-İnsâf*, 159-60.

On the other hand, al-Māturīdī (d. 333/944) emphasized that men would. At this point, Māturīdī scholars have stated that a man must feel that he will.[101] Therefore, the occurrence of human action is within his will.[102] According to Māturidīs, there is an intellectual necessity for human beings to generate their own free will. Therefore, this possibility could not be ruled out. Consequently, although there are different approaches to the issue of human freedom, Muslim theologians have attempted to demonstrate this by developing theories that human beings are free of their actions. According to them, if a man was not free in his actions and God punished him in the Hereafter, this would be unjust. Therefore, it can be said that today's theologians are against biological determinism within the framework of human freedom and responsibility.

When considered theologically, understanding, accepted as neurobiological and genetic determinism, reveals several problems. As partially mentioned in the previous sections, the understanding that human destiny is determined by genes eliminates human responsibility. When responsibility disappears, it becomes clear that it is impossible to condemn and punish those who commit evil deaths.[103] From a theological perspective, the foundations of punishment and reward are closely related to the human responsibility for one's actions. If deterministic claims are accepted as true, they would imply an issue of justice in the relationship established by God. Traditionally, the concept of divine justice assumes that humans can make choices and are accountable to them. Such thinking also leaves believers floundering the inescapable necessity of experiencing predetermined and unchangeable destiny. Therefore, biological determinism cannot be theoretically accepted. This theory is supported by the epigenetic paradigm, which rejects the genetic determinist perspective and emphasizes the complex interplay between genes and behaviors/traits. In the epigenetic paradigm, genes are not only seen as deterministic entities, but also as carriers of stability, while allowing for the presence of change. This perspective aligns with theological concepts emphasizing the transformative nature of human beings and their potential for growth and development. It acknowledges that individuals are not bound by a fixed and unchangeable genetic blueprint but rather have the capacity for adaptation and the ability to shape their own lives. In this respect, not only what genes bring to the species, but also what the species brings to the genes is important.[104] This epigenetic paradigm refutes the notion that genes are perceived as determinants of fate, by highlighting the significant role of environmental factors in a person's life. This finding emphasizes that the

101 Nureddin Es-Sabuni ve Topaloğlu, *Mâtürîdiyye Akaidi*, 151.

102 Mâtürîdî, *Kitâbu't-Tevhîd*, 234.

103 Aydın, *Din Felsefesi*, 164.

104 Soysal, *Gen Ötesi-İnsan Sonrası*, 97.

functions of genes are influenced by these environmental factors.[105] In this context, it supports the concept of free will, which should be theoretically accepted.[106] Although we are born into different parts of the world under various conditions, we generally have similar brain structures.[107] The fact that people share similar brain structures implies that, if one person is capable of doing something, others can also potentially do it.[108] This clearly demonstrates that justice is the ontological foundation for God's relationship with humans.

Brain plasticity is another ontological factor of human freedom. The human brain establishes a system of circuits by constantly changing their shape. Therefore, contrary to claims of neurobiological determinism, human identity, personality, beliefs, and behaviors do not have a final destination.[109] The mental imprints people form can be transformed into habits. Whatever behavioral patterns develop, this behavior becomes permanent and becomes one's personality. For example, if a person concentrates on good behavior, they become good. If someone develops bad behavior, it becomes bad, and this badness becomes permanent.[110] The state of variability between the good and bad in humans is also not permanent. This variability manifests throughout the human life.[111] Therefore, from a neuroethical perspective, the elastic aspect of the human brain structure can be considered the ontological basis for attributes of both divine justice and human choices.

Conclusion

The idea that biological determinism limits human freedom has led to several problems. Basing human behavior on a necessary cause– effect relationship has damaged the notion of man as a free and willed being, and has abolished God's effectiveness. Additionally, a man's inheritance of social status has made his freedom even more constrained and caused problems with God's justice. However, recent discoveries in genetic science have shown that biological determinism is insufficient to fully explain human behavior.

Theological problems arising from biological determinism in terms of human freedom and responsibility can be addressed and resolved through new paradigms

105 Karaçay, *Mutlu Beyin*, 50-51.

106 Soysal, *Gen Ötesi-İnsan Sonrası*, 137.

107 Karaçay, *Mutlu Beyin*, 28.

108 Aydın, *Beyin Sizsiniz*, 33.

109 Eagleman, *Beyin: Senin Hikayen*, 6.

110 Doidge, *Kendini Değistiren Beyin*, 217.

111 Eagleman, *Beyin: Senin Hikayen*, 21.

emerging in modern science. Recent advances in genetic science, particularly epigenetics, have provided evidence that genes can be influenced and shaped by environmental factors. This has undermined the claims of biological determinism and the assertion that genes solely determine human behavior. Furthermore, the scientific grounding of neuroplasticity in neurobiology has demonstrated that the human brain is a malleable and modifiable mechanism capable of continuous change and shaping. This further supports the notion that the human brain is not rigidly predetermined by biology but rather has the capacity for adaptation and transformation. Epigenetics and brain plasticity, two important fields in modern science, have revealed that human behavior is not solely determined by deterministic factors. They emphasize the significant roles of individual agency, freedom, and responsibility. These scientific advancements provide a broader perspective on human autonomy, challenging the notion of strict determinism and opening up new possibilities for personal growth, change, and the exercise of free will.

Epigenetics and brain plasticity can be considered appropriate approaches for evaluating the views of Kalām scholars in terms of human freedom and responsibility. While Mutazilite scholars emphasized that man's actions were brought about by his own will and power within the framework of Allah's justice, the Ash'arite school is generally based on the responsibility and will of man in his actions on the concept of kasb. The Māturīdīs, on the other hand, clearly emphasized human free will and argued that human beings chose their actions. Additionally, despite acknowledging that Allah created human actions in the historical process, we have demonstrated that even Jahm b. Safwān had views suggesting the human possession of will. Therefore, although theologians have displayed different methodological approaches, they clearly emphasize that humans choose their actions and, as a result, are inherently responsible beings.

The notion that for humans to be responsible beings, they must exhibit their behaviors freely also yields significant consequences in terms of understanding divine justice in Islamic theology (kalām). To deserve punishment and reward in the Hereafter, man must be free in his actions. Therefore, it is important for God's justice that individuals manifest these behaviors freely. If we consider that God endows humans with free will when creating them, it can be understood that humans should exercise free will to be accountable. The significance of human freedom is also emphasized in a theological context, as it aligns human responsibility with God's governance and justice. Otherwise, scholars of kalām (mutakallimūn) maintained that holding an unfree human being responsible for his/her behavior poses problems for divine justice. Therefore, the fact that epigenetics and brain plasticity put forward a scientific paradigm that emphasizes human freedom against

claims of biological determinism is also in line with divine justice. As a result, in our study, we have dealt with the issue of human freedom and fate from the perspective of divine justice to analyze and solve theological issues on a scientific basis. We hope that this study will be extended to other theological issues and lead to the reconstruction of Kalām's science within the framework of modern science. This approach will also prevent a possible crisis between Kalām and modern science.

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