

GENETIC ENVIRONMENTAL INTERACTIONS (APPLIED CONCEPTS IN THE GLORIOUS QUR'AN AND THE HONORABLE HADITH)

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SUMMARY: The objective of this paper is to extract useful ideas from the religious texts (The Glorious Qur'an and the Traditions of the Prophet, Hadith) that are compatible with the science of genetics. The Islamic scientific miracles in the Glorious texts of are screened for relevant links with the applied science of genetics. Special concerns are focused on the domain of the influence of environment on the genetic expression of human traits notably the behavioral ones. Important relevant impacts and applications are discussed as for example our role in reorienting behaviors.

In Islam, it is believed that all humans are born innately in a good temper. Their environmental material and cultural factors fashion them on different religions, thinking manners and philosophies (in the same manner as an animal born healthy can undergo cutting off or amputation later on).

"Each child is born in a state of Fitrah "pure Muslim nature", then his parents make him a Jew, Christian or a Zoroastrian, the way an animal gives birth to a normal offspring. Have you noticed any that were born mutilated?"

Furthermore, we have a role on genetic diseases many of which are influenced by the environmental conditions. Mother's internal environment and its effects on the sex of her offspring are also evoked. There is also a role of companions in the formation of our characters, our duty vis-à-vis this issue is discussed. Important philosophical consequences are extracted like the uniqueness of God in ideally judging the actions of people, as he is the only to be able to trace norms of reactions for all our actions and reactions for every one in the world under all possible conditions! This Islamic knowledge, which predates the recent discoveries with some 1400 years, was put in service of health and solving social problems.

The methodology of this paper can be extrapolated on other authentic religious texts of which ideas are not yet explored by science! This is an important process of strengthening the conviction and the convincing capacity of Islam as a divine religion! In fact, a clear distinction is made in Islam between those who know (and seek knowledge) and those who do not!

What! he who is obedient during hours of the night, prostrating himself and standing, takes care of the here-after and hopes for the mercy of his Lord! Say: Are those who know and those who do not know alike? Only the men of understanding are mindful (Az-Zumar, The Troops, Throngs, The Glorious Qur'an Chapter 39, Verse 9)

Key words: The Glorious Qur'an, Honorable Hadith (Prophet Mohammad's Sayings), Ijaz (Miracles), genetics, genetic-environment interactions.

INTRODUCTION

Genetics focuses on genes inherited from parents while environmental factors include all the external fac-

tors that influence organisms and even gametes directly or indirectly. Environmental factors include the material, physical, chemical and cultural factors like religion, education, schooling...

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Studying genes is the core of the science of genetics founded by Gregor Mendel (1822-1884) who discovered the law of segregation of alleles as well as the law of independent assortment of alleles. Genetics indeed focuses on phenotypes, genotypes, and the factors affecting both of them (1). Genes only are not the only factors affecting our characters, behaviors and performances. Environmental factors play also a role. It is clear that even ancient civilization realized the importance of environmental effects on the phenotype. This can be shown by practices like physical and mental training and even dressing of animals! However, studying of the environmental (nurture) and genetic (nature) fractions of effect on our phenotypes is relatively recent (e.g. studies of identical twins under different environments, studying genetically different subjects under the same environment...).

Variation among individuals may be due to genetic and/or environmental factors. The effect of genes can be quantified by heritability studies. Heritability describes and quantifies the proportion of phenotypic variation in a population that is attributable to genetic variation among individuals.

Genes alone are not all the story in our characters including behaviors, diseases... Identical twins who have exactly (or almost exactly) the same genetic makeup but who are raised in different families sometimes develop different diseases or health statuses (2). These types of findings suggest that our living conditions or environments are also very important contributors to health and disease. We know that the causes of many common diseases are not only genes but also the environmental factors. These diseases include heart disease, diabetes, cancer, depression, alcohol, tobacco and other drug addictions. Common diseases result, from a complex interplay of genetic and environmental factors. In the same manner as diseases, human behavior is influenced by both genes and environment (3).

The idea of the environmental effects on our traits can be realized in the following revealing text, where the effect of the environment on the human behavior is documented. A misled man was ordered to leave the straying environment and go to a guidance land in order to change his behavior:

"Among those who came before you was a man who killed 99 people. He then asked to be guided to the most prolific worshipper from the inhabitants of the earth, and he was directed to a monk. He went to him and told him that

he had killed 99 people, and he asked whether it was possible for him to repent. The monk said, 'No.' The man killed him, thus making him the 100th victim. He then asked to be directed to the most knowledgeable of the Earth's inhabitants, and he was guided to a scholar. He went to him and told him that he had killed 100 people, and he asked whether it was possible for him to repent. The scholar said, 'Yes, and who will stand between you and repentance. Go to such and such land, for in it dwell a people who worship Allah, so go and worship Allah with them. And do not return to your land, for it is indeed a land of evil.' He left, and when he reached the halfway point of his journey, he died. The angels of Mercy and the angels of Punishment disputed with one another [in regard to his case]. The angels of Mercy said, 'He came to us repentant, advancing with his heart towards Allah.' The angels of Punishment said, 'Indeed, he never performed any good deeds.' Then an angel came in the form of a human being, and both groups of angels asked him to be the judge between them. He said, 'Measure the distance between the two lands. Whichever land he is closer to is the land that he is closer to [in terms of being of its people]. They then measured the distance and found that he was closer to the land that he was heading towards, and so it was the angels of Mercy who then took his soul'.

The only capable of tracing the complete norm of reactions for all our actions in life:

On the day when the trumpet shall be blown, and We will gather the guilty, blue-eyed, on that day * They shall consult together secretly: You did tarry but ten (centuries) * We know best what they say, when the fairest of them in course would say: You tarried but a day * And they ask you about the mountains. Say: My Lord will carry them away from the roots * You shall not see therein any crookedness or unevenness * On that day they shall follow the inviter, there is no crookedness in him, and the voices shall be low before the Beneficent Allah so that you shall not hear aught but a soft sound * On that day shall no intercession avail except of him whom the Beneficent Allah allows and whose word He is pleased with * He knows what is before them and what is behind them, while they do not comprehend it in knowledge * And the faces shall be humbled before the Living, the Self-subsistent Allah, and he who bears iniquity is indeed a failure * And whoever does good works and he is a believer, he shall have no fear of injustice nor of the withholding of his due (Taha, The Glorious Qur'an Chapter 20, Verses 102-111)

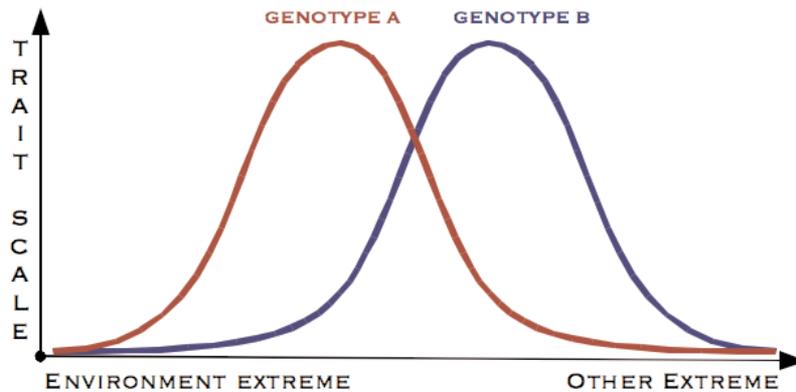


Figure 1: The effect of environment on traits.

Interesting relevant indications in the field of interaction between genetic expression and environment are investigated in The Glorious Qur'an and the Sayings of the Prophet of Islam, Mohammad (PBUH). This study focuses on the effect of the environmental conditions on our genetics especially genetic diseases, behaviors and the effects of companionship and even the determination of sex by the internal environmental factors of the mother (e.g. pH, nutrition...). The consequences of these environmental effects on our life are discussed.

The effect of environment on traits is proved scientifically and therefore, the Glorious Scripts of Islam that mentioned and detailed this issue demonstrates the authenticity of Islam.

METHODOLOGY

All the relevant texts (Verses from The Glorious Qur'an, Sayings of Prophet Mohammad, PBUH) are taken into consideration to screen for relevant links on genetic knowledge in the Islamic texts (i.e. interaction between genes and environment). For most cases, The Glorious Qur'an Verses and authentic Hadiths are considered. However, very few Hadiths, weakly attributable to the Prophet, are cited in limited occasions with an appropriate scientific support. In this respect, such Hadiths are not necessarily wrong but their credibility is not perfect! Such Hadiths can be considered and cited but with conditions put by many Islamic scholars and well reviewed

(<http://www.binatiah.com/go/forum.php?action=view&id=2081>). These conditions are respected in this paper. Links

between religion and science are based on complementary approaches (e.g. screening for genetics in the Glorious Texts as well as screening for religious Texts and meanings in modern genetics).

NORM OF REACTION: GENETICS, PHILOSOPHY AND RELIGION

In genetics, a norm of reaction describes the pattern of phenotypic expression of a single genotype across a range of environments. For a given genotype, a different norm of reaction can exist; in other words, an enormous complexity can exist in the interrelationships between genetic and environmental factors in determining traits. The environmental effect should be understood in a broad sense spectrum including the physical, chemical, physiological and nutritional environment in the womb and the changes that can happen after birth including education, religion, behaviors...Such factors can shape the personality, behavior and performance.

We are however, requested (in our social, professional and evidently religious life) not to be robotically oriented by our genes but to shift ourselves toward better performances:

And as for him who fears to stand in the presence of his Lord and forbids the soul from low desires * Then surely the garden--that is the abode (An-Naziat (Those Who Drag Forth, Soul-Snatchers, The Glorious Qur'an Chapter 79, Verses 40-41).

One of the menings inspired from the idea of norm of reaction (mentioned above) is that our traits and behaviors are functions (to a given extent) of the environment. Only

the Powerful Creator, Allah is able to trace the norm of reaction (under all the possible combinations of genotypes vs. environmental conditions) for all creatures including ourselves! Consequently, only God is capable of judging people and rewarding or punishing them!

Master of the Day of Judgment (Al-Fatiha, The Opening, The Glorious Qur'an Chapter 1, Verse 4)

The absolute sovereignty the Day of Judgment is confirmed uniquely for the Allah, the One, and the Almighty:

"...Who is the sovereign today? No one answers. He answers Himself Sovereignty is Mine, The One, The Powerful".

The same meaning of the ultimate and absolute judgment by The Almighty, Allah is confirmed in another Saying of Prophet Mohammad (PBUH):

Narrated by Abu Horaira in a very long hadith of a few pages describing the events including horrible ones of the Day of resurrection:...The Almighty, Allah says: I am The Compeller, I am The Compeller, I am The Compeller. The Almighty calls: Who is the possessor of reign and domination? No one responds. He answers Himself saying: Allah, The Unique, The Subduer...(Ibn Katheer as Ibn Katheer 3/276 and said very uncommon "ghareeb jiddan")

GENETIC ENVIRONMENTAL INTERACTION AND DISEASES

Many genes influence our risk of developing diseases, and whether or not that risk actually leads to disease depends on complex interactions between genes and environment. Certain environments or experiences that are known to increase our chances of physical or mental health problems are especially risky for people who also have a particularly vulnerable genetic make-up. Therefore, the tendency of many people to classify the cause of disease as either genetic or environmental does not seem to be accurate. This is perhaps the most important fact in understanding the role of genetics and environment in the development of disease. Indeed, some rare diseases, such as Huntington or Tay-Sachs disease, may be the result of a deficiency of a single gene product; but these diseases represent a very small proportion of all human diseases. Lichtenstein *et al.* (4) showed that inherited genetic factors make a minor contribution to susceptibility to most types of neoplasms (sporadic cancers). This finding indicates that the environment has the principal role in causing some diseases like the sporadic cancers.

Given that gene-environment interactions underlie almost all human diseases, the public health significance of genomic research on common diseases with modifiable environmental risks is based not necessarily on finding new genetic causes but on improving existing approaches to identify and modify environmental risk factors in order to better prevent and treat disease (5). Just as it might be possible to alter the environmental conditions, their effects on the genetics can also be stopped or even reversed. Reversible effect of environment on genetics can take place even in the fetal life. It seems that the environmental predisposition factors influence the ultimate fate in life (being fortunate and happy or misfortunate). These fates as reported by the Prophet (PBUH) can be under the influence of the environment even if the initial genetic program is already established. We can understand this by the environmental effect on the initially programmed genetic fate.

"Misfortunate people are so since their fetal life and fortunate people are so since their fetal life also"

Happiness and unhappiness includes organismal and genetic predisposition, which are programmed from the first fetal stages (i.e. influenced by the fetal environment). This can be understood from the Saying of the Prophet "A fortunate human is fortunate in the womb and a misfortunate one is misfortunate there also".

"When forty-two nights are passed, Allah sends an angel to the nutfah (embryo) and he gives it shape, forming its hearing and sight, its skin, flesh and bones. Then he says, 'O Lord, male or female?' Then your Lord decrees whatever He wills and the angel writes it down"

The ability of environmental factors to shape health and disease involves epigenetic mechanisms that mediate gene-environment interactions. Epigenetic gene regulation comprises the heritable changes in gene expression that occur in the absence of changes to the DNA sequence itself. Epigenetic mechanisms include chromatin folding and attachment to the nuclear matrix, packaging of DNA around nucleosomes, covalent modifications of histone tails (e.g. acetylation, methylation, phosphorylation), and DNA methylation. The influence of regulatory small RNAs and micro RNAs on gene transcription is also increasingly recognized as a key mechanism of epigenetic gene regulation (6). Cellular epigenetic mosaicism and individual phenotypic variability can occur even in genetically identical individuals (7). The interdisciplinary field of environmental epigenomics emphasizes the potential for nutritional and environmental factors to influence fetal, adult, and

transgenerational epigenetic gene regulation, resulting in numerous phenotypic consequences (8). A compelling evidence that early developmental exposure to BPA (chemical used in the manufacture of polycarbonate plastic) can change offspring phenotype (production of yellow colored fur in mice) by stably altering the epigenome (e.g. DNA hypo methylation), an effect that can be counteracted (DNA methylation) by maternal dietary supplements such either methyl donors like folic acid or the phytoestrogen genistein (7). One important consequence of these important works (in addition to the effect of environment on traits) is the indication that acquired traits can be transmitted! This indicates a kind of validity (at least epigenetically) of Lamarckian idea of inheritance of acquired characters, which is dismissed in most literature sources!

GENETIC ENVIRONMENTAL INTERACTION AND HUMAN BEHAVIOR

Even though environment is an important component in the human behavior (as detailed through out this manuscript), the basis of Human behavior like indulgence and clemency is inscribed in our inherited characters (e.g. genes). This can be understood from the following Hadith:

...The Prophet said: O, Ashaj, you have two characters that Allah and His messenger like. What are they, asked Ashaj. The Prophet answered Indulgence and Patience. Ashaj asked, did I acquire them or Allah created me possessing such characters? The Prophet answered, Allah created you patient and indulgent...

It is evident that the environment has an important role in determining a basal behavioral aspect of humans (e.g. religion...). This is manifested by the fact that most people follow automatically the religion of their parents:

"Each child is born in a state of Fitrah "pure Muslim nature", then his parents make him a Jew, Christian or a Zoroastrian, the way an animal gives birth to a normal offspring. Have you noticed any that were born mutilated?"

To take advantage from the concept of the effect of the environment on our behavior, the Prophet (PBUH) warns us from the beautiful plants grown in dirty or dungy places! When he was asked for an interpretation, he said that is the beautiful woman in a bad environment or family! (Hadith weakly attributable to the Prophet, qualified as weak by Islamic specialized scholars like Al-Albany and others).

"Do not marry with a woman born and raised up in an immoral family"

Gene-environment correlations are reviewed by Jaffee and Price (9). Virtually all-human diseases result from the interaction of genetic susceptibility factors and modifiable environmental factors, broadly defined to include infectious, chemical, physical, nutritional, and behavioral factors (10). Evidence for gene-environment interaction in the development of adolescent antisocial behavior is demonstrated by Cadoret *et al.*, (11). The phenomenon of gene-environment correlation (rGE) plays an important causal role in psychiatric illness. The identification of rGE may suggest targets for environmental intervention even in highly heritable diseases (9). In an illuminating study, it is found that the childhood abuse changes the activity of genes in the abused children's brains, specifically, genes that are involved in the response to stress hormones secreted from hypothalamic-pituitary-adrenal endocrine glands. This change is significantly found in the brains of abused children who finish by suicide compared with controls. The change is shown to be of epigenetic order; that is, in the nucleotides chemical appendages rather than the nucleotides sequences (12).

In The Glorious Qur'an, the effect of the bad environment leading to a disobedience of the instructions of God through His messenger, Prophet Noah (PBUH) is documented. Actually, Noah spent 950 years in preaching his people and only a few followed him!

And certainly We sent Nuh to his people, so he remained among them a thousand years save fifty years. And the deluge overtook them, while they were unjust (Al-Ankaboot, The Spider, The Glorious Qur'an Chapter 29, Verse 14)

Noah (PBUH) concluded that the environment of his people (i.e. they will lead astray the servants) was hopeless and consequently, he desperately invoked The Almighty, God against them!

And Nuh said: My Lord! leave not upon the land any dweller from among the unbelievers * For surely if Thou leave them they will lead astray Thy servants, and will not beget any but immoral, ungrateful (children) (Nouh, Noah, The Glorious Qur'an Chapter 71, Verses 26-27).

Noah realized that there would not be any positive change in the infidel attitude of his people. His realization was confirmed to him by a divine revelation cited in the following Verse:

And it was revealed to Nuh: That none of your people will believe except those who have already believed, therefore do not grieve at what they do (Hud, The Glorious Qur'an Chapter 11, Verse 36).

The role of environment is not absolute; it has a wide range of interaction with our genes. It seems that our characters are not solely determined by genetics nor are they solely determined by environmental factors. Al-Sharafeen and Matakah (13) report that some of The Glorious Qur'an Verses are mistakenly cited as examples of sole genetic effect on some of the human traits and behaviors like faith and chastity. To demonstrate that both genetics and environment determine characters, Allah made a clear distinction between "Adam and Noah", "the family of Abraham and the family of Imran". Adam and Noah are cited individually to illustrate the disjunction between traits (belief, faith and good conduct) and genes transmissible to their children. Nevertheless, Abraham and Imran are cited with their families to illustrate the transmission of characters that go in parallel with transmission of genes and environmental conditions! This is a rich field for further investigations (see section of "Conclusions and Perspectives")

Allah did choose Adam and Noah, the family of Abraham, and the family of 'Imran above all people * Offspring, one of the other: And Allah heareth and knoweth all things (The Glorious Qur'an, Chapter 3, Al 'Imran, The Family Of 'Imran, The House of Imran, Verses 33-34).

The effect of the environment is also well documented in The Glorious Qur'an on the faith of people as well as on their hypocrisy. People of desert (A'rab) are qualified as the most infidel and hypocrite! However, this is not an absolute rule as indicated by the subsequent Verses:

The Arabs of the desert are the worst in Unbelief and hypocrisy, and most fitted to be in ignorance of the command which God hath sent down to His Apostle: But God is All-knowing, All-Wise * Some of the desert Arabs look upon their payments as a fine, and watch for disasters for you: on them be the disaster of evil: for God is He That heareth and knoweth (all things). * But some of the desert Arabs believe in God and the Last Day, and look on their payments as pious gifts bringing them nearer to God and obtaining the prayers of the Apostle. Aye, indeed they bring them nearer (to Him): soon will God admit them to His Mercy: for God is Oft-forgiving, Most Merciful (Al-Tawba, Repentance, The Glorious Qur'an Chapter 9, Verses 97-99)

The Prophet said that those who inhabit the desert acquire antipathy and rudeness!

"Habitants of desert are rude"

Once, the Prophet (PBUH) accepted a gift from a man of desert (A'raby) and this man was not satisfied until the Prophet gave him multiples of that gift!

"I was about not to accept gifts except from Qureish, Ansar, Thaqeef and Daws"

It is clear that human attitudes and behaviors (e.g. faith, cordiality, enmity, skillfulness...) are transmitted by education and culture even if such characters need a genetic basis. This meaning is depicted from the following Hadiths:

"Cordiality is inherited and transmitted"

"Cordiality and enmity are inherited and transmitted"

Prophet Mohammad incited Arabs to master "throwing", javelin throwing and sharpshooting and gave arguments that the father of Arabs; Ismail was a "thrower"! Evidently, the Prophet linked genetics to the environmental practice (e.g. training).

"O, children of Ismail, master throwing, your ancestor was a thrower"

THE EFFECTS OF COMPANIONS

The effects of companions (as an essential component of the environmental actors) is well documented in The Glorious Qur'an. Only the believers will not be mutually enemies on the Judgment Day:

The friends shall on that day be enemies one to another, except those who guard (against evil) or except those who are righteous or except those who kept their duty (to Allah) (Al-Zukhruf, Ornaments or Gold Luxury, The Glorious Qur'an Chapter 43, Verse 67).

Those who mal-select their companions or friends will ultimately regret:

And the day when the unjust one shall bite his hands saying: O! Would that I had taken a way with the Messenger * O woe is me! would that I had not taken such a one for a friend ! * Certainly he led me astray from the reminder after it had come to me; and the Shaitan fails to aid man (Furqan, The Criterion, The Standard, The Glorious Qur'an Chapter 25, Verses 27-29).

The Prophet goes beyond that to extrapolate the totality of one's religious status (and his or her behavioral traits) on the religious status of his companions (the social environmental actors):

"The religion of the one follows that of his companion"

Friends transmit their behaviors and morality whether positive or negative to their companions:

"The example of a good friend in the assembly is like

the example of the one who works carrying musk. The example of the bad friend is like the one who works in a blacksmith. The one who works with musk will either give you some, sell you some or you will go away smelling nice. The blacksmith will either burn your clothes, or you will away smell bad."

MOTHER'S INTERNAL ENVIRONMENT AFFECTS THE SEX OF HER OFFSPRING

Traditionally in science, it known that the father determines the sex of the offspring in human similarly to most sexually reproducing animals. However, it seems that the role of the father is just in the genetic determination. The mother seemingly has also an environmental determinative role regarding the sex of offspring. The internal environment of the mother like the pH level could have a role in the success of either the father Y-bearing or father X-bearing gamete in the competition of fertilization. If the mother's acidic vaginal fluids (pH 3.8-4.5) (14, 15) dominate on the father's basic seminal fluid (pH 7.2-8.0, 7.2 and 8.0) (16), there would be rather a female and vice versa (there would be a boy in case the male's basic environment dominate over the female's acidic environment).

According to a Hadith, narrated by Thauban, when a Jew asked him about child creation, He answered him: "male fluid is white and female fluid is yellow, when they mix and male fluid prevails, they, with God permission, produce a male child, but if female fluid prevails, they, with God permission, produce a female child..."

These meanings of the maternal effects parallel to the paternal effects on the determination of the sex of offspring are also interestingly found in the Sayings of the Prophet dated of some 14 centuries!

The mother's nutrition also is found to influence the sex of the baby. A high caloric nutrition of a wide range including K, Ca and vitamins C, E and B12 enhances begetting boys and vice versa. That could explain the noticeable decline in begetting of boys in industrialized countries where young women tend to have a caloric-poor and a low varied nutrition (17).

Supportive examples are found regarding the effect of environmental conditions on the sex of progeny. Sex ratio in broods of *Pelvicachromis* fishes (*kribensis* and relatives) is reported to vary with pH; when low (acidic), water favors males and vice versa (18, 19). Low pH as well as higher temperatures favor the production of males in

fishes like *Apistogramma cactuoides*, *A. gephyra*, *A. hongsloui*, *A. nijsseni* (20). Nevertheless, an old study conducted on rabbits failed to establish a clear correlation between the pH of the seminal fluid and the sex determination of offspring (21).

EFFECT OF TEMPERATURE ON THE SEX OF OFFSPRING

Non-genetic sex-determination systems exist and are well documented. In some species of reptiles, including alligators, some turtles, and the tuatara, sex is determined by the temperature at which the egg is incubated. The sex ratio of alligators and crocodiles is strongly biased towards females, often as high as 10 females to 1 male. Skewed sex ratios (that is, ratios other than 1:1) are commonly found in species exhibiting environmental sex determination. In crocodilians, the temperature of egg incubation is the environmental factor determining sex. If the temperature is cool, around 30°C, the hatchlings are all females. Warmer temperatures, around 34°C, hatch all males (22, 23). Similarly, it is found that genetically female-destined guppies (fishes) mature as males if raised in extreme temperatures (24, 25).

In humans, the few studies on environmental temperature and birth sex ratios have produced mixed results.

In a study conducted on historical Sami populations from northern Finland, using a 145-year-long annual time series, warm years are found to be correlated with a male-biased sex ratio. The net effect of one degree Celsius increase in mean temperature during these 2 years corresponded to approximately 1% more sons born annually. The physiological and ecological mechanisms mediating these effects and their evolutionary consequences on parental fitness remain unknown (26).

Human sex ratios at birth have been proposed to be affected by environmental temperature (27). In contemporary Germany, conceptions during warm months resulted in a male-biased birth sex ratio (28). Furthermore, in the late twentieth century Europe, more males are born in southern latitudes than in northern latitudes, whereas the opposite is found in North America (29).

Temperature-related effects on human birth sex ratio thus remain poorly known and controversial and therefore merit more investigations (See section "Conclusions and Perspectives").

NO DEFINITIVENESS, HOWEVER!

In some Hadiths weakly attributable to the Prophet (PBUH), the prophet prohibits (in principle" from marrying with those born and raised up in amoral families:

"Do not marry with a woman born and raised up in an immoral family"

Nevertheless, it might be, possible to marry with those grown in such mentioned amorally-healthy family if there is a convincing possibility of improvement and reparation! Actually, people tend clearly to be influenced and even to conform to their environments but this is not an absolute rule. Not always people conform to their environments. An example is illustrated for nonconforming to good environments regards the wife of Nuh and the wife of Lut, both husbands were Prophets, however, their wives acted treacherously towards them. The example for nonconforming to bad environments concerns the wife of a tyrant, pharaoh (firon) who asked God to build for her a house in the Paradise and to deliver her from the unjust people. The Glorious Qur'an recites the following Glorious Verses as a demonstrative examples on these exceptions:

Allah sets forth an example to those who disbelieve the wife of Nuh and the wife of Lut: they were both under two of Our righteous servants, but they acted treacherously towards them so they availed them naught against Allah, and it was said: Enter both the fire with those who enter * And Allah sets forth an example to those who believe the wife of Firon when she said: My Lord! build for me a house with Thee in the garden and deliver me from Firon and his doing, and deliver me from the unjust people (Al-Tahreem, Prohibition, Banning, The Glorious Qur'an Chapter 66, Verses 10-11)

Similarly, in the story of Noah, he could not guide his own son:

And it moved on with them amid waves like mountains; and Nuh called out to his son, and he was aloof: O my son! embark with us and be not with the unbelievers * He said: I will betake myself for refuge to a mountain that shall protect me from the water. Nuh said: There is no protector today from Allah's punishment but He Who has mercy; and a wave intervened between them, so he was of the drowned (Hud, The Glorious Qur'an Chapter 11, Verse 42-43)

God, the Almighty reminded him that the real son is that who follows the orders of the Almighty!

And Nuh cried out to his Lord and said: My Lord!

surely my son is of my family, and Thy promise is surely true, and Thou art the most just of the judges * He said: O Nuh! surely he is not of your family; surely he is (the doer of) other than good deeds, therefore ask not of Me that of which you have no knowledge; surely I admonish you lest you may be of the ignorant (Hud, The Glorious Qur'an Chapter 11, Verse 45-46)

The ultimate destiny is never known except by God.

Say: No one in the heavens and the earth knows the unseen but Allah; and they do not know when they shall be raised Al-Naml (The Ant, The Ants, The Glorious Qur'an Chapter 27, Verse 65)

"The keys of the unseen are five, none knows them but Allah, then the Prophet (PBUH) recited: No person knows what he will earn tomorrow, and knows that which is in the wombs. He only sends down the rain and the only to know when it comes. No person knows in what land he will die. With Him (Alone) is the knowledge of the Hour"

Verily the knowledge of the Hour is with Allah (alone). It is He Who sends down rain, and He Who knows what is in the wombs. Nor does any one know what it is that he will earn on the morrow: Nor does any one know in what land he is to die. Verily with Allah is full knowledge and He is acquainted (with all things) (Luqman, The Glorious Qur'an Chapter 31, Verse 34)

Therefore, there is still a room for maneuvering and working to improve and ameliorate almost everything. This is not contradictory to the divine pre-destiny, which is masked from our knowledge. Therefore, what is thought mistakenly to be the destiny might be just something modifiable by our actions and the ultimate events and actions represent the divine destiny!

And pointed out to him the two conspicuous ways * But he would not attempt the uphill road (Albalad, The city, The Glorious Qur'an Chapter 90, Verses 10-11).

Human behavior can be modified through life under different conditions and therefore, the human-human judgment and assessment should be minimized especially for morals and believes! For example, it is prohibited to qualify people of non-believers as far as they employ the greetings of Islam, the peace! In addition, who knows what would be the fate of those who think of themselves believers and those who think of themselves disbelievers? Things can be inversed!

O you who believe! when you go to war in Allah's way, make investigation, and do not say to any one who offers you peace: You are not a believer. Do you seek

goods of this world's life! But with Allah there are abundant gains; you too were such before, then Allah conferred a benefit on you; therefore make investigation; surely Allah is aware of what you do (An-Nisa', Women, The Glorious Qur'an Chapter 4, Verse 94).

Fortunate people might finish misfortunate and vice versa.

CONSEQUENCES OF ENVIRONMENTAL INFLUENCES ON CHARACTERS

As the human characters including behavior are influenced by the environmental factors, which are not idealized nor normalized for the people (30), the human judgment vis-à-vis the qualification and absolute values should be avoided and rendered strictly to the absolute Knower of the norm of reactions for humans. The absolute judgment on the Day of Resurrection is, therefore, God, the One, and The Almighty:

The day when they come forth, nothing of them being hidden from Allah. Whose is the Sovereignty this day? It is Allah's, the One, the Almighty (Ghafer, the Forgiver, God, the Glorious Qur'an Chapter 40, Verse 16).

In the following Glorious Hadith, the Prophet of Islam instructs not to judge the faith of people especially when the consequences are ultimate!

Muslim, in "The Book of Faith" in "The Chapter of Prohibition on the Killing of a Kafir after he says 'la ilaha illa Allah", and al-Bukhari, in "The Book of Military Expeditions" relates: "Khalifa informed me, on the authority of Miqdad b. al-Aswad, that he said to the Prophet of Allah (S.A.W.): 'What do you think, if I were to meet a man from the disbelievers, and we were to fight, and if he struck one of my hands with his sword and severed it, then fled from me to the shelter of a tree, beseeching: 'I have submitted myself to Allah', should I, O Prophet of Allah, kill him after he has said this?' The Prophet of Allah (S.A.W.) said: 'Do not kill him'. So he said: 'But, O Prophet of Allah, he cut off one of my hands, then he said it after severing it'. The Prophet of Allah (S.A.W.) said: 'Do not kill him. Were you to kill him, he would be in your position before you killed him, and you would be in his position before he had uttered those words'".

Evidently, rendering the ultimate judgment to God, the Powerful and Ultimate Knower, concerns the morals and believes rather than the laws that should be respected, however! In other words, judgment of behaviors that are not detrimental to the others should be ren-

dered uniquely to God, but the behaviors that concern the others like for example sexual abuse or even violation of traffic lights should be judged and punished so that the human lives and properties can be saved and respected!

Application of laws (e.g. punishment of thieves under specific conditions) avoids society chaos and preserve lives and properties of people:

As to the thief, Male or female, cut off his or her hands: a punishment by way of example, from Allah, for their crime: and Allah is Exalted in power (The Glorious Qur'an Chapter 5, Al-Ma'ida, The Table, The Table Spread, Verse 38).

To understand the law of recompense and punishment imposed by God, the compassionate, we should recall that all creatures are intrinsically submitted to God and can intrinsically orient themselves toward the good and bad conduct. Allah judges them on this basis. Otherwise, the Just and The Merciful Almighty would not punish them in case of going involuntarily astray!

Is it then other than Allah's religion that they seek (to follow), and to Him submits whoever is in the heavens and the earth, willingly or unwillingly, and to Him shall they be returned (Al-Imran, The Family Of Imran, The Glorious Qur'an Chapter 3, Verse 83)

Have We not given him two eyes * And a tongue and two lips * And pointed out to him the two conspicuous ways? * But he would not attempt the uphill road (The Glorious Qur'an Chapter 90, Al-Balad, The City, Verses 8-11).

In the light of the previous display on the effect of environments on our traits and our space of maneuvering, we find in the Glorious Verses that God guides those who are willing to be guided and does not guide the one who leads astray:

If you desire for their guidance, yet surely Allah does not guide him who leads astray, nor shall they have any helpers (Al-Nahl, The Bee, The Glorious Qur'an Chapter 16, Verse 37)

And say: The truth is from your Lord, so let him who please believe, and let him who please disbelieve; surely We have prepared for the iniquitous a fire, the curtains of which shall encompass them about; and if they cry for water, they shall be given water like molten brass which will scald their faces; evil the drink and ill the resting-place (Al-Kahf, The Cave, The Glorious Qur'an Chapter 18, Verse 29).

We think, indeed, there is no definitiveness in the effect of the environment on our behaviors and traits in general (29). Indeterminism leaves a room for intervention. Therefore, even though the interaction between the genes and the environment is reported in the literature, the effect of the environment on genetics can be reversible upon changing the environmental conditions. Many of the human efforts (e.g. culture, education, experiences...) are attempts to ameliorate performance based on ameliorating the environmental conditions, broad sense speaking. Therefore, there is still place for reparatory educational and cultural interventions and voluntary measures. In the field of our voluntary actions and maneuvering space, the indeterminism is confirmed in The Glorious Qur'an:

And pointed out to him the two conspicuous ways * But he would not attempt the uphill road (Albalad, The city, The Glorious Qur'an Chapter 90, Verses 10-11)

He who forsakes his home in the cause of Allah, finds in the earth Many a refuge, wide and spacious: Should he die as a refugee from home for Allah and His Messenger, His reward becomes due and sure with Allah: And Allah is Oft-forgiving, Most Merciful (Al-Nisa, Women, The Glorious Qur'an Chapter 4, Verse 100)

In fact, the ultimate fate is hardly or even never known; the apparently happy person might end misfortunate and vice versa. This can be understood from the interpretation of Al-Bokhary reported Hadith. Human behavior can be modified through life, and therefore again, the judgment and assessment of people should be minimized!

"There was a man who fought most bravely of all the Muslims on behalf of the Muslims in a battle (Ghazwa) in the company of the Prophet. The Prophet looked at him and said. "If anyone would like to see a man from the people of the Fire, let him look at this (brave man)." On that, a man from the People (Muslims) followed him, and he was in that state i.e., fighting fiercely against the pagans till he was wounded, and then he hastened to end his life by placing his sword between his breasts (and pressed it with great force) till it came out between his shoulders. Then the man (who was watching that person) went quickly to the Prophet and said, "I testify that you are Allah's Apostle!" The Prophet asked him, "Why do you say that?" He said, "You said about so-and-so, 'If anyone would like to see a man from the people of the Fire, he should look at him.' He fought most bravely of all of us on behalf of the Muslims and I knew that he would not die as a Muslim (Martyr). So when he got wounded, he hastened

to die and committed suicide." There-upon the Prophet said, "A man may do the deeds of the people of the Fire while in fact he is one of the people of Paradise, and he may do the deeds of the people of Paradise while in fact he belongs to the people of Fire, and verily, (the rewards of) the deeds are decided by the last actions (deeds)"

However, legitimate excuses exonerate from some duties, as not every thing is maneuverable in our actions. Limits are a fact:

There is no blame on those who are infirm, or ill, or who find no resources to spend (on the cause), if they are sincere (in duty) to Allah and His Messenger: no ground (of complaint) can there be against such as do right: and Allah is Oft-forgiving, Most Merciful (Al-Tawba, Repentance, The Glorious Qur'an Chapter 9, Verse 91).

The notion of the effect of the environment on the human and his behavior implies the duty of staying where the religion can be maintained and practiced freely.

Surely (as for) those whom the angels cause to die while they are unjust to their souls, they shall say: In what state were you? They shall say: We were weak in the earth. They shall say: Was not Allah's earth spacious, so that you should have migrated therein? So these it is whose abode is hell, and it is an evil resort (An-Nisa, Women, The Glorious Qur'an Chapter 4, Verse 97)

CONCLUSIONS

The important and sensitive subject of the effect of environment on our traits is investigated in this paper in the light of scientific discoveries and religious texts (The Glorious Qur'an and Honorable Sayings of the Prophet, Hadith). Important concepts and applications are extracted. To an extent, there is no definitiveness dictated by our genes. By working on the environmental conditions, our genetically based behaviors, performance and even diseases can be positively ameliorated! There is no definitiveness in the expression of genes and in our behaviors. This is compatible with the divine law of recompense and punishment.

More relevant inspirations could be investigated by religion scholars and scientists. Religion provides a divine source of knowledge. This is a scientific investment in the good sense as it is evidenced by clear links found between the religious texts and science in all fields (Ijaz or scientific miracles in religion). Here, in this paper, demonstrative links are found between religion and the science of genetic in the attempt to answer the question of the effect of environment

on our characters and behaviors, which are at least partially genetic. The religious facts beside the scientific ones that we should follow are detailed for those who know!

And He it is Who has made the stars for you that you might follow the right way thereby in the darkness of the land and the sea; truly We have made plain the communications for a people who know (Al-Anaam, Cattle, Livestock, The Glorious Qur'an Chapter 6, Verse 97)

PERSPECTIVES

In the section of "Effect of Temperature on the Sex of Offspring", the effect of temperature (i.e. an important element of the environment) on the sex ratio of human progeny is detailed with some controversy. It is reported, however, that an increase of 1°C yields an annual increase of 1% in favor of boys (26). Are the Y-bearing male gametes more resistant to high temperatures than the X-bearing male gametes? Does temperature favor fertilization by one gamete rather than the other. Do global statistics on males and females ratios in hot and cold countries support such reports? The effect of temperatures on the human sex needs evidently further investigations...

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The disjunction between behavioral traits and genetics in case of "Adam and Noah" and the junction in case of "Abraham and Imran" (detailed in the section "Genetic Environmental Interaction and Human Behavior") is appealing for more research. What is the relative participation of genes and environment on our traits like faith and chastity? It is the domain of heritability studies (Heritability is the proportion of phenotypic variation in a population that is attributable to genetic variation among individuals (30)) and represents an important perspective for this paper.

Allah did choose Adam and Noah, the family of Abraham, and the family of 'Imran above all people * Offspring, one of the other: And Allah heareth and knoweth all things (The Glorious Qur'an, Chapter 3, Al 'Imran, The Family Of 'Imran, The House of Imran, Verses 33-34).

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