

Development of Human Values: Understanding the Role of Genes and Environment as Control

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Abstract—Values originate from the word ‘valere’ which means ‘worth’ which guide us to lead our lives in accordance with social approval. Concept of values according to Cambridge Dictionary is the worth of something. These can be intrinsic or instrumental. Values guide our behavior, provide direction for leading a meaningful life and promote individual and national well being (Kumar, 2008). They are defined as socially defined desires and goals that are internalized through the processes of conditioning, learning and socialization (Indrani, 2012). Genes are the carriers of heredity. The genetic component of human life dictates our physical features, the biochemical pathways, even the presence or absence of disabilities while environment has the ability to alter gene expression (Datta, 2007). Genetic activities mostly occur at the cellular level while environment can be considered at macro levels such as our society, the nation and finally the global environment. Environmental variables such as (1) temperature (heat, cold), (2) particulate matter (gases, suspended matter), (3) light (darkness, light), (4) air (polluted, clean), (5) substances (teratogens, harmless substances) all impact genes. The present study is unique as it aims at understanding the role of environment and genes on development of human values, thus bridging the gap between sociology of values (coined by Radhakamal Mukherjee, 2005) and biotechnology. It makes an attempt to answer the age old question: what matters most-Nature or Nurture? Meta-analysis of various papers and research articles addressing the role of genes and environment on human behavior and value development has been carried out as part of this study. The findings reveal that human nature and behavior are controlled by genes at the cellular level but the value development and enrichment takes place at the environmental level.

Keywords: Genes, Environment, Human values, genetic expression, environmental variables.

1. INTRODUCTION

In this research paper, the researchers have made an attempt to answer at least partly, the big question: ‘Do humans follow moral living and display human values like cooperation, empathy, caring, sharing etc because they are genetically programmed to do so? Or do they learn from the environment in which they live and grow’. Genes create neural structures and brain anatomy which is linked with values as found through certain research studies (Datta, 2007; Zacharopoulos et al., 2016). At the same time our families, parents, teachers

and society lay down moral rules, discipline and modes of conduct which we internalize. The present research paper tries to open the Pandora’s Box of nature-nurture conflict and try to answer whether human values and behaviours are genetically controlled or shaped by the environmental factors including socialization, cultural factors, learning and experiences gained during our growth and development. According to Wikipedia, nature here in this context refers to the genetic inheritance and biological factors which shape a human being while nurture refers to the experiences and learning gained by an individual during life.

2. RATIONALE OF THE STUDY

Biological sciences are running the forefront in scientific technological revolution with the advent of gene therapy, genetic engineering, gene mapping which is changing the lives of men (Olson, 1989). Such revolutions are helpful in widening the horizon of medical sciences, tackling dreaded diseases and paving the way for complete eradication of human suffering (originating from diseases) in the near future. On one side is the ever increasing view that ethics must monitor the effects of science and technology for our present day activities and on the other hand there is very less research on how genes and environment contribute in molding human personality and shaping human values. Studies have revealed a relation between genes and human personality, values but there is lack of any concrete and empirical evidence in this regard. A novel study by Zacharopoulos, Lancaster and Maio (2016) investigated the genetic components connected to human values and behavioral phenotypes with special reference to Neuroticism and established a connection between genes, human values and behaviours. The finding also resonated dearth of concrete evidence and research in this direction.

3. OBJECTIVES OF THE STUDY

- To find out and understand the effect of genes as control on human values

- To find out and understand the effect of environment as control on human values
- To find out and understand which has a greater effect on human values: genes or environment

4. RESEARCH METHODOLOGY

Researcher carried out an extensive review of literature pertaining to areas of genes, environment and values and meta-analysis was done to reveal various findings. The sources of literature were books, articles, journals, scientific and non scientific literary are accessed from library, ERIC, NAP and NDL.

5. RELATION BETWEEN HUMAN VALUES AND ENVIRONMENT

Indrani (2012), points out in her study that value begins at home but, are developed, refined and strengthened in schools. Hence the study supports the role of environment in development and strengthening of human values [5]. Aggarwal, 2008 refers to the important role played by parents, community and mass media in imparting value education to the child. Hence the study favors the role of social environment in value development. Singh (2008) writes about the importance of the mother-child relationship, the ability of the child to sense the parental attitude and responses even at very early ages, leading to feelings of insecurity, rejection, self isolation and despair in case of lack of affectionate and supportive environments [17]. Hofferth (2006) says that no conducive, negative, insecure environment and lack of parental involvement in the child's life results substance abuse, childhood delinquency, decreased academic performance and loss of emotional stability [4]. Taneja (2005) mentions that exposure to a more stimulating environment helps to counteract and reverse the effects of initial retardation; as shown by research studies [21]. Apart from the individual's genetic potentialities, various pre natal, peri-natal and post natal causes of mental retardation, cognitive development also occurs largely in response to a variety of environmental stimulations requiring incorporation, accommodation, adjustment and reconciliation. The more varied environments to which a child is exposed, higher is the resulting level of effective stimulation. James (2005), cites that the child's social adaptation is influenced by the family and siblings [6]. Positive parent behavior and child development are linked, hence there is a need to shift from child centered training programs to family centered training programs. The personality problems score correlated with depression, unhappy appearance, mental conflict, sensitivity, unnecessary worrying, nervousness, and feelings of inferiority. The conduct problems score correlated with cruelty, destructiveness, truancy, stealing, lying, swearing and disobedience. Brown (2006) lends support to the role of environment as a control by stating that presence of the custom of the joint family, kinship and other social institutions

provide an inbuilt added mechanism of support and promote values like respect for elders, empathy towards others, leadership qualities, help, sharing and caring for those in need, among children growing up in such a cultural system [1]. The Environment around us consists of various subsystems such as:

- **Inanimate environment:** consisting of the natural elements-air, water, soil, land, fire etc
- **Animate environment:** consisting of microbes, plants and animals and man
- **Social environment:** consisting of our neighborhoods, society and communities
- **Psychological environment:** consisting of our consciousness and self awareness
- **Physical environment:** consisting of environmental variables such as (1) temperature (heat, cold), (2) particulate matter (gases, suspended matter), (3) light (darkness, light), (4) air (polluted, clean), (5) substances (teratogens, harmless substances)
- **Chemical environment:** contains genes, bimolecular materials etc

Table 1: Comparison of different orders existing on earth – animate and inanimate

Order	Inanimate	Animate	
	Material	microbes, insect, plant and animal life	Human life
Component	soil, water, air	body having life (prana)	body having prana + 'I' sense (ego)
Activity	composition	respiration + reproduction + decomposition	respiration + reproduction + decomposition + 'I' sense
Innateness	existence	existence + growth	existence + growth + development
Nature	inanimate	animate + nurture	value and moral behavior

(Source: adapted from Sharma, 2013 [16])

6. VALUES

“Values permeate the entire human existence” (Sharma, 2013). These act as guidelines for leading a good and moral life. According to Rokeach (1979), values are defined as “enduring belief, a specific mode of conduct or end state of existence along a continuum of relative importance” [15]. Human values are abstract and complex traits which are affected by several factors and molded by several agencies such as:

- Parents and families
- School
- Media

Value education has three basic objectives:

- To develop the proper and morally right behavior
- To develop the right kind of attitude
- To develop the ability to work with the right cohesion and co-existence

7. RELATION BETWEEN HUMAN VALUES AND GENETICS

Genetics is the science that studies the principles and mechanics of heredity, or the means by which traits are passed from parents to offspring [18]. It originated in the mid-19th century through the discoveries of Gregor Mendel who experimented with pea plants over a ten year period and found that certain traits are inherited [8]. Classical genetic studies reveal that environment plays an important role and often results in variance. The textbook of elementary genetics cites an example of Chinese primroses which produces white flowers if grown at low temperatures and red flowers if grow at a relatively higher temperature. “This variation in flower colour within a perfectly pure race of plants is evidently due to environment rather than the genetic makeup.” Variations in characteristics of size, shape (quantity) are clearly due to environmental causes [18].

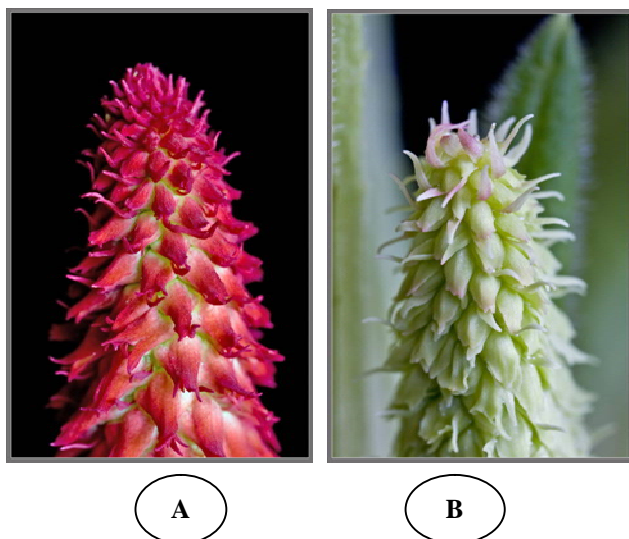


Figure 1: Chinese Primroses

Figure shows A-Chinese Primroses red coloured, B-Chinese Primroses white coloured

DNA is considered a life molecule, whose expression, repression and mutation is controlled by the environment. Gene wide association study (GWAS) is considered as the

most appropriate genetic methodology to investigate the genetic component of human values [23]. Such studies reveal the presence of Single Nucleotide Polymorphisms (SNPs). It is known that environment alters gene expression and can be seen in nature as SNPs.

In a research study titled ‘Genes and environment in the enrichment of values’ by Datta (2007), discusses the role of genes and environment in enrichment of values. The paper addresses the pertinent issue of nature-nurture conflict. The paper clarifies that though genes are the hereditary regulators, their expression, repression, mutation, suppression are controlled by environmental variables. Education in turn provides a congenial environment for gene expression regulation [2]. Hence environment plays a major role in controlling the expression of good and adaptive behaviours and suppresses the expression of undesirable and non adaptive behaviours. Value education and genes are related as shown by studies related to evolutionary Darwinism, studies related to twins, studies related to genetic mutations, gene therapy, stem cell research, cloning and designer babies. The researcher analyzed some gene related aspects in a more detailed manner as stated below:

Altruism: It is defined in Oxford Dictionary as “showing a disinterested and selfless concern for the well being others”. In the biological world altruism is an act in which the animal sacrifices its own well being for the benefit of another animal. Kin related altruism can be inherited and “altruistic genes” may be passed on from one generation to another [12]. Humans display altruism in form of cooperation and team spirit. Studies reveal that humans may have developed empathy and other altruistic behaviours due to inheritance of related genes from their ancestors. Environmental factors like need for survival, reproductive success and protection from predators, prompted the inheritance and expression of the related genes.



Figure 2: Animal Altruism

Figure shows a humpback whale bellows in the foreground to save a seal from the attack of a killer whale in the background thus displaying altruistic behavior. (Photograph reproduced without permission from Pitman et al. 2016 accessed from Psychology Today-Animal Altruism)

Mutation: these are defined as changes in the genes which are either as a result of environmental changes, genetic rearrangements and some cannot be linked to environment or past history of the race. These are heritable changes. Ex. Hornless mutant animals have originated during the breeding process.

Imprinting behavior: Studies reveal the presence of special neural wiring that allows imprinting. It is seen in young birds in the very early periods of their life after hatching, when they learn to follow the first large, moving object, naturally the mother bird. Hence it takes cues from the environment and imprints it and develops it into a behavior. Similarly very small human children can also observe and imitate the mother and learn to follow her around the house.

Reversion: often breeders observe that crosses between true breeding varieties produces progeny resembling a remote ancestor more than either parent. Mendelian genetics says that for reappearance of an old trait is due to reunion of two or more complementary factors necessary for its production, which were lost either due to mutation or suppressed due to other reasons in the course of history

Embryonic Stem cell research: such a research has to be governed by strong govt. laws and policies.

Designer babies: these babies undergo genetic alteration at the prenatal stage “inside mother’s womb” to remove “diseased genes/ disease triggering genes” and also for ‘altering physical traits’ [14].

Cloning: is considered much debated issue especially in areas of moral ground and human ethics. Two reports viz. Report of National Bioethics Advisory committee (1997) and Report by National Academy of Science, (2002) state that cloning can be considered if “ethical and social implications” of cloning-to-produce-children beyond the scientific and medical aspects of the procedure. “Broad ethical debate must be encouraged so that the public can be prepared to make decisions if human reproductive cloning is some day considered medically safe for mothers and offspring.”

Neo-eugenics: it is a modern practice which shares an old history with classic eugenics aimed at “goal of increasing good birth” and is seen to propagate injustice and abuse in the name of scientific advancement and public health progression, hence of a moral concern [20].

Bioterrorism: The use of biological weapons was banned in 1972 by the Convention on the Prohibition of the Deployment, Production, and Stockpiling of Bacteriological and Toxin Weapons [19].

Biosafety and Genetically Modified Organisms (GMO): It is an organism with artificially altered genes. Such transgenic organism which do not occur naturally pose Biosafety risks (Tripathi, 2001)

8. FINDINGS FROM REVIEWED LITERATURE

The researcher carried out extensive research reviews and the findings are summarized below:

- The reviewed literature clearly shows a **bend towards studies related to scientific revolution and ethics**. Most research studies were aimed at discovering new ways of how human ethics should respond to modern and emergent revolution in biological and technological science (both in field and laboratories). The concept of exploring the direct influence of genes and genetic engineering human values was sadly neglected.
- It is imperative to find out and **understand the effect of genetic engineering on manifestation of human values** as genetic changes are inherited. Thus this is line with the statement by ethicist Rabbi Hillel “If not now, when?” [12].
- The reviewed studies shed light on the longstanding **public unease related to scientific advances**, especially when they challenge established human myths, premises and explanations. A major example in point is the conflict between evolutionary biologists and religious leaders regarding evolution of man from primates.
- Many prominent philosophers and thinkers believe that dreaded diseases like AIDS, Small pox are “**Divine retributions against sinners**” (John Woolman) as cited in [12].
- Human gene therapy is touted as the next big treatment method but it faces criticism owing to the risks involved, the nature of genes involved and the fact that **tampering with human genetic code is viewed as morally incorrect**.
- **Scientific advancements must be aligned with human values** as there is a great risk of misuse of such advancements as seen in bioterrorism and biowarfare.

9. EDUCATIONAL IMPLICATIONS OF THE STUDY

- The present study raises some questions like: (1) are moral and value behavior inherited? (2) Do twins show same or similar moral values? (3) Is neural symmetry achieved by stem cell research? (4) How to bring humanism in science teaching and link genetics with human values and ethics?
- Schools should impart scientific education by laying emphasis on human values and ethics and initiate discussion on such topics during teaching activities.
- It is imperative to create awareness regarding human nature of science and link scientific advancement with humaneness to avoid misuse of science

10. CONCLUSION

It can be safely stated keeping in mind the findings from the studies quoted and mentioned above that “the traits of an individual are a complex interweaving of both environment and genes” [13]. Hence we can say that the genetic heritability and a safe, war, secure, affectionate and stimulating environment should be provided to all individuals’ right from an early age. Proper training in value development and moral sciences should be given as many traits are not inherited simply learnt during our growth and development. This is of prime importance in the field of education and social sciences, that teachers and parents lay emphasis on value development of the child. Scientists especially those dealing with genetic engineering a humane approach is needed and public should be made aware of the genetic consequences in the future. The findings reveal that human nature and behavior are controlled by genes at the cellular level but the value development and enrichment takes place at the environmental level.

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