

INTELLIGENCE, THE IMPACT OF GENETIC OR ENVIRONMENTAL FACTOR

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Abstract

In this article dealt with problems related to the relationship between the impact of heritage and environment in the formation of intelligence. Initially are given information on the concept of intelligence, its theories and types, and then are expressed facts, emerged from the studies on the impact of genetic factors or environmental development. At the end is presented in detail the concepts of a trait heritage and environmental impact to a particular trait, known as heritability and environment ability.

Keywords: *intelligence, emotional intelligence, heritability, genetic factors, fenotip environment ability, monozigota*

Introduction

Intelligence, by definition refers to general mental ability to reason, the ability to solve problems, to think abstractly, learning and the ability to benefit from past experience. Intelligence can be measured in different types of human tasks and activities. Intelligence as capability is expressed in many aspects of a person's life. It is based on a variety of mental processes, including memory, learning, perception, decision-making, thinking, and reasonable. Intelligence is an important factor because it determines the quality and success of the individual in his adaptation to the natural environment and social as well as on different tasks. Although the debate over the impact of the environment or heritage exists a long time, all have come to the conclusion that: Intelligence is the result of influence about half due to the nature (inheritance) and about half to be due to the lifestyle and other environmental factors. The precise mechanisms by which genetic and environmental factors operate remains unknown. Identification of the specific biological and environmental variables affecting intelligence is one of the most important challenges facing researchers in this area.

It is the current level of mental functioning of individual's ability to use knowledge, problem solving and adaptation to the world. Mostly people have an intuitive notion of what is intelligence. The meaning people express in different words, by which they distinguish between different levels of intellectual skills. In this way people conceive of individuals as

brilliant or clumsy, wise or stupid, fast or slow, and so on, showing the differences they think they have the level of skills. Although it is a universally accepted definition on intelligence, people continue to debate about what, exactly it is. The basic question remains: “*Is intelligence a general skill or several independent systems capabilities?*”, “*Is intelligence a property of the brain, a behavioral characteristic, or a set of knowledge and skills?*”.

The simplest definition regarding intelligence emphasizes that it is expressed in any test that measures intelligence. Although this definition is correct in itself, we can say that it has some problems.

First, it is cyclical. Tests treated like element to verify the existence of intelligence which by her is measured by tests.

Second, many different intelligence tests, which are applied and exists, do not measure all the same thing. In fact, the creators of the first tests of intelligence, had no exactly idea what they wanted to measure.

Most researchers define intelligence as everything is measured by intelligence tests, but some try to argue that this definition is not sufficient and point out that intelligence is the ability to evaluate every one's culture. According to this perspective, the concept of intelligence changes from one culture to another. In the past years, a number of theoreticians have argued that the standard intelligence tests measure only a part of human skills, which can be considered as aspects of intelligence. Other scholars believe that standard test exactly measure intelligence, does not invalidate its measurement. So, what are some of the main theories on intelligence?

For more than a century, the psychologists have demonstrated the general composition of intelligence, or even if there is a real “general” intelligence. One of the most basic questions is whether, intelligence is a unique, general mental ability or it consists of a lot special abilities. Charles Spearman held that general intelligence is completely a kind of mental energy source, which flows through every action (Spearman, C. E. 1904). Spearman believed that people who are brilliant in one area are often so in the other. While the American psychologist Thurston, did not have the same opinion. He indicated that intelligence consists of seven specific kinds of mental skills: spatial ability, memory, speed or perception, the fluidity in speaking, numeric ability, reasoning and meaning of words (Thurston, 1938). Recent psychologists, have greatly expanded the concept of intelligence and how it can best be measured. Robert Strenberg has proposed a triatic theory of intelligence. He argues that human intelligence includes a greater variety of skills, which are just as important as even more limited skills, estimated by traditional intelligence tests. (Robert Strenberg, 1985).

Analytical intelligence, related to mental processes that is highlighted by the majority of theories on intelligence, such as ability to learn how to do things, to adopt new knowledge to solve problems and to perform tasks successfully.

Creative intelligence is the ability to adapt to new tasks, the use of new concepts and to respond more effectively to these situations.

Another contemporary theory, the theory of multiple intelligence by Gardner. He believes that intelligence consist of some special skills and each is relatively independent from the others. Gardner ranked eight types of intelligence: logical-mathematical, linguistic, spatial, musical, corporeal-kinesthetic, interpersonal, personal and natural (Howard Gardner, 1993). Approach of Gardner has had a major impact, mainly because it notes specific skills that everyone has. He also notes that different forms of intelligence, often have different values, which are assigned by different cultures.

Also another contemporary theory, proposed by Daniel Goleman, is emotional intelligence, which shows how effectively they perceive and understand people their own emotions, the emotions of others and how to control their emotional behavior (Daniel Goleman, 1995).

He claims that one of the reasons that intelligence tests fails is that the do not take into consideration the individual's emotional strength. In general, five factors are known to contribute to emotional intelligence. Goleman talks about the fact that people have two minds: the rational and the emotional mind. The components of emotional intelligence are: self-knowledge, self-regulation, self-motivation, empathy and ability to create relationships with other people. According to him, our level; of emotional intelligence is not genetically determined and is not developed only in childhood. Our emotional intelligence determines the potential that we have to learn practical skills based on five elements of intelligence that we mentioned above.

From this we can understand that the development of emotional intelligence is very important for success in live. Although a person has enough knowledge and intelligent ideas, fails to understand the emotions and sentiments of the people, fails to manage them, it makes that person to withstand difficulties establishing relationships with others and creating a successful career.

Recent years have a profound transformation in the way the conception of human intelligence in general and in particular emotional intelligence. About emotional intelligence, the impetus to research in depth, served two works of American psychologists Salovey and Mayer, who can be considered the fathers of emotional intelligence. They described emotional intelligence as a form of social intelligence, an individual's ability to monitor the feelings and emotions to himself and to others, the ability to capture the differences between them and to use them, for guidance in thinking and in action. Speaking about intelligence that has attracted the attention of researchers is the fact that which of the factors is genetic or environmental one, it is decisive for a person's intelligence. Studies in social sciences have produced more polemics than they have reflect the influence of the environment or genetics to intelligence

Strict representative of their view of the genetic factor as determinants of intelligence, believe that every person is born with a certain amount of intelligence (Perkins, 1995). They argue that opportunities to improve intelligence are few and that different education programs in particular, are not expected to effect the growth of IQ (intelligence quotient). But those who see the education programs of early intervention as crucial to compensate the effect of low-level impact on intelligence or other disadvantages. In their view, these programs help to create equal opportunities for all people.

Perhaps the most contentious issue related to intelligence has been by some researchers claim that genetic factor are responsible, not only for differences in IQ among individuals, but also for differences between groups. In this view, genetic factors have contributed to the low performance of certain radical groups and ethnic groups in IQ tests. Others consider such treatments, associated with genetic differences influence the group, as scientifically unfounded as racist, noting that some racial groups are by nature less intelligent than others.

Nowadays almost all scientists agree that intelligence arise from the impact of two factors, genetic and environmental. It required a careful study and treatment, in order to determine in a particular case that which is a crucial factor: the impact of environmental or heritage (A.Collins et al., 2000; Turkheimer, 2000). For example, an element commonly used to evaluate the family environment and its impact on a child, the number of books at home. But this fact can be associated possibly with parental IQ, because more intelligent people tend to read more.

The child's level of intelligence, can be influenced or parental genes (genetic factor) or the number of books in the home (family environment) (N.L.Segal, 2000). Moreover, parents can buy more books for their child in response to his intelligence, which is genetically influenced. Which of these possibilities is correct, it cannot be determined without a full study of all the factors involved. In our treatment we will try to show the values and contribution of each of the two factors that effect a person's intelligence, views and discussions made in this regard.

The influence of genetic factors.

In the treatment of behavioral genetic, inheritance of a feature (known as the "heritability"), refers to the percentage of a feature differences between individuals of a population that are due to genetic factors. Genetics and environmental factors known as environment ability, can all contribute to differences between individuals in their observable characteristics (the "phenotype" of them). Intelligence heritage usually defined as the percentage of change in IQ scores that is associated with genetic factors. To assess the legacy of intelligence, scientists have compared the IQ of individuals with varying degrees of influence of genetic factors.

Hundreds of studies have been conducted, with tens of thousands of participants with a view to measure the legacy of intelligence. From these studies it is generally accepted that genetic factors account for 40 to 80% of the variation in intelligence test scores, and most experts have agreed on a figure of about 50%. But the estimates are valuable legacy for the population and not just for individuals. Therefore I can never say that, in what percentage specific to an individual intelligence is inherited from the group he is part of, or part of the individual heritage.

Although there are numerous studies done on the impact of genetic factors in intelligence, studies of twins, have provided particularly useful information regarding this aspect. Identical twins develop from an egg (monozygotic), it was established that are genetically identical to each other. The twins developed from separated eggs (dizygotic), like other ordinary natives, have only about half of their genes in common.

Comparisons between monozygotic twins and dezygotic twins, can be very useful in determining the impact of the heritage associated with intelligence. Scientist have found that IQ scores of monozygotic twins are more similar to each, while dizygotic twins IQ are less similar to each other. This discovery indicates a genetic influence on intelligence factor. From the results of IQ of dizygotic twins comes something very interesting, *"they are more similar to each other than those of the birth of the other ordinary, not twins, who do not have this similarity between them, a finding that indicates maybe to the influence of environmental factors."*

(Bouchard & McGue, 1981; N. Brody, 1992; Mackintosh, 1998; Plomin & Petrill, 1997). Some researchers, talking about this change, point out that dizygotic twins treated more similar maybe than those born ordinary, because they are the same age.

Some of the strongest evidence for genetic influences on intelligence, comes from studies of identical twins (monozygotic), adopted in various houses in the east and as a result, increase in different environments. Monozygotic twins are genetically identical, so any difference in their IQ scores should be completely due to environmental differences and any similarities must be due to genetic influences. Results from these studies have shown that IQ scores of identical twins raised in different environments are very similar between them, and almost similar to those of adult identical twins together. But studies by the adoptee to be valid, must place where the adoption of twin pairs, must be odd. If adopted twins have a high IQ and are selectively placed in an adoptive home with parents with higher intelligence, it becomes impossible to separate the effect of genetic factors from environmental ones.

Another way to study the contribution of genetics related to intelligence, adoptions are also studies in which researchers compare the adopted children with their biological families and adoptive families. Adopted children have no genetic connection with the adoptive parents or biological parents with adopted children. So each similarity in IQ between adopted children and their adoptive parents, or their biological children, must be due to the similarity of the environment where they live, rather than genetic factors. (Bouchard, 1997; McGue, Bouchard, Iacono, & Lykken, 1993; Plomin, Fulker, Corley, & DeFries, 1997; Plomin & Petrill, 1997). There are two interesting discoveries from studies of adopted children.

Firstly, children's IQ has just adopted a little relationship with their parents' IQ and adoptive to their biological children.

Secondly, after the child ran away from home of adoptive parents, this relationship becomes even smaller. In general, the adopted child's IQ, it's always similar to the IQ of biological parents than parents with adoptive IQ parents. Moreover, after they leave the house of their influence adaptation, they become more similar to their biological parents. Both these findings show the importance of genetic factors in intelligence. People sometimes assume that if intelligence is heritable, then it cannot be changed or improved through environmental factors. This assumption is wrong. For example, the length in humans is very heritable, but one must admit that the average length in humans has increased in the twentieth century to the populations of many industrialized nations, and that as a result of improved feeding and health care. Similarly, performance on IQ tests is increasing with each generation, and although some scientists attributed this phenomenon to genetic changes, most of them believe that environmental changes, to some extent, can increase a person's intelligence.

The influence of environmental factors.

If genetic influence accounts for about 40 to 80% of differences in intelligence, then the environmental impacts comprise about 20 to 60% of the total changes. Environmental factors, including all incentives, on which, an affected person from conception to death, including food, cultural information, education and social experiences. Although it is known that environmental factors can be powerful forces in the formation of intelligence, it is not clear yet exactly how they contribute to intelligence. In fact, scientists have identified several specific environmental variables that have direct effects on intelligence and are disputable. Many environmental variables have little effect and change their effect on each person, making them difficult to identify.

During school education is an important factor affecting children's intelligence. Children who do not attend school or who follow it not regularly have lower results on tests of IQ than children who regularly attend school with lower quality and performance, tend to show improvements in IQ. Besides transmitting information through the learning process in schools for pupils, the school during this process also enables these students to solve problems, to develop abstract thinking, the ability to focus, which are necessary in IQ tests.

Many researchers have done research whether early intervention programs can prevent low level of intelligence that can result from poverty or inappropriate environments (Bronfenbrenner, 1999). In the United States, it has funded a program for preschool children from families with incomes below the poverty level. This program and similar programs in other countries, tend to attempt to ensure that children's activities that can enhance cognitive development, including reading books, learning the alphabet and numbers, also learning the names and colors, painting and other activities. These programs often have large effects on IQ scores. Children who participate in these programs have 15 points more on IQ tests compared with control groups of children with similar conditions, but which are not included

in these programs (Scarr & Weinberg, 1976). Unfortunately, the performance of the children involved in these programs, lasting as long as they are involved in this intervention.

When children who have participated in these programs enter in school, their IQ (for a period of several years), decrease the level of the control group. This effect is known as the fading impact.

Although early intervention pre-school programs does not seem to give consistent results regarding the coefficient of IQ, some studies suggest that they may have other long-term positive effect. For example: “Consortium for the Study Longitudinal” reported that participants are less likely to remain in class, less likely to need and additional learning, and more likely to complete high school than children who had not attend these programs, even though both groups show almost the same levels of academic achievement. Preschoolers involved in early intervention programs can benefit from improved health and eating habits, and sometimes their mothers could benefit from additional education programs offer. Considering the fact that a significant portion of changes in intelligence is due to environmental factors, programs of early intervention, are able to provide significant benefits and consistent with regard to the coefficient of IQ, which indicates that they are identify specific environmental variables affecting IQ.

Two popular environmental variable affecting intelligence are family size and birth order. Children from smaller families and those who born earlier in their families, tend to have higher results then in the IQ test. These effects are very small and make up only a few points in IQ test, also must be said that when researchers study only encounter a large number of families.

Although there has been considerable debate about the effects of other environmental variables, certain substances in the prenatal environmental may affect intelligence later. For example: some pregnant women, which consume large amounts of alcohol can have children with syndrome of alcohol fetal, reflected on physical abnormalities , mental retardation and behavioral problems, and even exposure to a moderate amount alcohol can have a negative impact on the development of intelligence. Scientist have discovered that some substances that occur during infancy or childhood, can have a negative impact on intelligence. For example, children with high levels of lead in blood, taken during breathing or eating, tend to have lower scores on IQ tests. Even during childhood poor nutrition, should affect negatively affect the level of IQ (Michel, 1989; Neisser et al., 1996; Streissguth, Barr, Sampson, & Bookstein, 1994; Vogel, 1997; Vorhees & Mollnow, 1987). In each of these cases, there is a correlation between environmental factors and the level of intelligence, but we cannot conclude that these factors affect directly on intelligence. Other environmental variables in this category include parenting styles and physical environmental of the house.

Although this debate is there for a long time, they all have concluded that intelligence is the result: half of impact due to the nature (inheritance) and half due to way of nutrition and other environmental factors. The precise mechanisms by which genetic and environmental factors operate, is still known. Identification of the specific biological and environmental variables affecting intelligence, is one of the most important challenges faced by researchers in this field. So, what are some of the important features about estimates of “heritably” (inheritance of a trait) and “environment ability” (environmental impact of a feature)? Let us reflect below.

1. Heritability and environment ability are abstract concepts. No matter what the odds are there, heritability tells nothing about specific genes that contribute to a feature. Similarly, an evaluation of the environmental coefficient, did not give any information about important environmental variables that effect behavior.
2. Heritably and environment ability are concepts related to population. They do not show anything about an individual. One of the heritability coefficient of 0.40 – inform

us that, on average, about 40% of individual differences that we observe (we can say that are associated with hesitation), in some way can be attributed to individual genetic differences. It does not mean that 40% of the timidly of any person, is because of his genes and 60% to the other, it is due to its environmental impact.

3. Heritability depends on the range of typical environments in which the population is studied. If the environment is fairly uniform population, the heritability may be low. In other words, if everyone is treated in the same environment, then any changes that we see at the most, will be due to genes; and heritability will be great in this case. But if people are treated in different environments, the heritability can be small.
4. Environment ability range of genotypes depends on which population is studied. This is similar to what was discussed above. If the genotype of the population is fairly uniform, then environment ability may be high, but if the range of differences in genotype is too large, then environment ability may be low. In other words, if people have the same genotype, then any changes that we see at most, will be due to environmental and environment ability will be great in this case. But if people have different genotypes, then environment ability may be small. However, this is probably not typical of human behavior, it belongs specially trained animal behavior.
5. Heritability is not due for a therapeutic nihilism. Even if heritability depends on a range of environments typical in a population study, it tells us little about extreme environmental interventions used in some therapy.

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