

Is intelligence influenced by heritability,
environmental influences, or both?
How is intelligence influenced
by these factors?

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“Every investigator who actually studies the behavior genetics of human intelligence believes that there is some role both for heredity and for environment in intelligence” (Sternberg, p. 14)

Reading varied articles, I came to the realization that the debate between hereditarianism and environmentalism has been a strong controversy for centuries. The argument between the two aspects is whether heredity or environment has the most influence on humankind’s intelligence. The heritability and environment factors are extremely complicated and strictly interacting with one another. I think it is improper to invent a standard definition for intelligence, due to the variation between psychologists (heredity and environment), scientists, and educators. From each area of science’s perspective, each field endeavors to invent a convenient definition for intelligence. From my understanding of intelligence, I think intelligence is a person’s unique ability to appropriately comprehend certain mental problems and effectively react and reflect the environment in which he/she lives. In addition, to perceive the complex relationship between heredity and environmental factors regarding intelligence, I believe it is proper to understand what heredity and environmental factors mean. As personal definitions, heredity is a process of transmission, by genes, of specific traits from ancestor (parents) to descendant (infants). The environmental influence on a person is the sum of all exterior conditions (society, culture, and life experience) that may affect the life of an individual. Since the focus on the perpetual debate between nature versus nurture, hereditarianism emphasizes science and the importance of the role of genetics factors. On the other hand, environmentalism emphasizes human variability. However, by common consent, the truth as Sternberg states in his article, *Myths, Countermyths, and truth about intelligence*, is “intelligence could be partially or even highly heritable and, at the same

time, partially or even modifiable” (Sternberg, p.14). Also, in his review of Sternberg & Grigorenko’s book, *Intelligence, Heredity, and Environment*, Akamatsu says, “both heredity and environment contribute to intelligence, and [they] both interact in various ways” (Akamatsu, p. 84). On the basis of such statements, it is very obvious that each side has its own evidence and its role in effecting intelligence. However, both heredity and environment are very important in determining the level of one’s intelligence.

Environment Perspective

Having discussed briefly about each aspect of the controversy between heredity and environment, discussion turns to focus on some important environmental factors that are anticipated to influence intelligence. Even though heredity has obvious influences on human intelligence as numerous studies have indicated, I believe that one can argue that environment has no contributions to intelligence. Considering the environment impact, several environmental factors can affect intelligence in various ways. Some of these factors may affect the whole population, and some may affect individuals in certain groups. One of these important factors is social and cultural background. I think social and cultural background has a major role in developing intelligence. Furthermore, families differ from each other in respect with their backgrounds. It is known that families are part of the culture. Not surprisingly, some families place more emphasis on education and concern themselves about improving their children’s achievement in schools. I think that the more families aware of and knowledgeable about the importance of education, the more positive and effective result will be reflected on their children’s achievement. Singh says, “ each class of parents value schooling and educational success saw themselves as supporting and helping their children to achieve success at school”

(Singh, 1996). In 1948, a study was conducted by McCall et al. found that children who obtained high IQ scores are raised in families that value and take education into a significant consideration. On the other hand, some families place more emphasis on primary and survival learning skills. Those families' children are anticipated to gain low IQ scores because there is neither motivation, stimulation, nor encouragement from their families (McCall and at el, 1973). Bruner says, "intelligence depends on the incorporation of culture" (Burner in Singh, 1996). Therefore, it is obvious that educational opportunities and experiences will not be equal, which finally affect intelligence. In addition, there are others factors that somehow affect intelligence. These factors are, (Neisser et al, 1995) listed in the report of the Board of Scientific Affairs of the American Psychological Association on August, (a) Social Variables including occupation, schooling, interventions, and family environment; (b) Biological Variables including nutrition, lead, perinatal factors, and alcohol; (c) Continuously rising test scores; and (d) Individual life experiences.

Heredity Perspective

In the past years, genetics were able to persuade most psychologists that heredity plays an effective role in influencing intelligence (Plomin & DeFries, 1998). However, a high degree of heredity does not mean that the environment has no influence on the development of any trait (Neisser et al, 1995). For instance, traits such as weight can be inherited, but it can be modified by the surrounding environment. Another trait is height. Height is an inherited trait, but it has increased in recent generations in the United States (Sternberg, 1996).

Considering the importance of genes' role in human beings' intelligence, to my knowledge, in the process of chromosomes transference, each parent has 46 chromosomes. The mother transfers only 50% of her chromosomes, which also equals 23 chromosomes. Also, The father transfers only 50% of his chromosomes, which equals 23 chromosomes, too. The final transferred chromosomes to the embryo is 46 chromosomes. In addition, each chromosome has a particular function that represents a specific trait. Therefore, it should be taken into account that "there is no single gene for intelligence, personality, behavior, or even height" (Scott, 1998). For example, a specific chromosome is responsible for eye color, and another one is responsible for hair color. So environment has nothing at all to do in such traits. However, it is important to clarify that environment can be divided into categories. These categories are *Shared Environment* and *Non-Shared Environment* (Hughes & Cutting, 1999). Each category may or may not have effects on individual's intelligence.

To more illustrations, one of the most common research methods is *Twin Studies* (Scott, 1998). Twin studies are used to estimate the influence of genes and environment on individual intelligence. For instance, Monozygotic (MZ) refers to identical twins (either Shared Environment or Non-Shared Environment) that share 100% of their all genes, but Dizygotic (DZ) refers to fraternal twins (Shares Environment) that share only 50 % of their genes (Hughes & Cutting, 1999). In 1981, a study was conducted by Bouchard and McGue, which showed the following findings:

Intelligence Measure	Correlations		
	MZT N=4672	DZT N=5546	MZA N=29
IQ'	.85	.58	.73

MZT= Monozygotic reared together. **DZT**= Dizygotic reared together. **MZA**= Monozygotic reared apart.

The study of MZ twins who rose in the same family found the median IQ correlation was .85, and the median IQ correlation of MZ twins who rose apart was .73. However, the median IQ correlation was .58 in more than 40 studies of DZ twins who were reared together (Bouchard and McGue, 1981).

Additional details, since MZ is derived from one fertilized zygote, in the case of identical twins, it is anticipated that the twins will obtain very close IQ scores, even if they are raised in different environment. Furthermore, DZ is derived from two fertilized zygotes. Therefore, in the case of fraternal twins, it is expected that the twins will obtain close IQ scores but not as close as the identical twins because they are not identically heredity. As a result, the data for identical twins that reared together and apart indicates a strong influence of heredity on intelligence.

To conclude, since no specific definition determines exactly what intelligence is, the debate over the importance of heritability and environmental factors on intelligence will probably continue as if there is no way to isolate heredity and environment from one another. Further, I believe that for various reasons that any kind of tests will contain errors (even a naïve error), and IQ tests are not excluded. IQ tests can be useful tools to measure certain learning skills (Sternberg, 1996). However, obtaining a high score in IQ tests does not simply mean that a person is very bright or intelligent. This person may not show satisfaction efforts in some areas, and vice versa (Singh, 1996). Finally, I believe with no doubt that both heredity and environment could possibly play a significant role in humans' intelligence.

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