

Is intelligence innate?



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Intelligence is innate is a very complex claim. It is hard to determine whether or not the genotype of humans solely affects our intelligence without considering external factors that contribute towards our developmental growth. The dispute over innate versus acquired; the performanceist view versus the environmentalist view is driven by the everlasting nature and nurture debate. To further examine the claim that intelligence is innate, this essay will explore the various definitions of the key words. By doing so, a sufficient understanding of the terms will be provided from a scientific perspective. The various issues that root from these terms that lead to misinterpretations and misunderstandings will also be examined briefly. Secondly, this essay will attempt to outline and discuss the arguments that justify the claim that intelligence is innate and that the talents that individuals possess are from an innate, genetic foundation. Subsequently, a detailed insight will be provided for the environmentalist view of intelligence. Environmentalists believe that intelligence is learned and acquired through the environment. This provides an insight of the performanceist and the environmentalist view, as it is scientifically impossible to conclude without observing an issue from all perspectives and examining the justification provided for the issues. To finish off, this essay will discuss the interactionist view, which suggests that both genetics and the environment, through interaction, contribute towards the development to produce phenotypes. The Oxford dictionary describes intelligence as the ability to acquire and apply knowledge and skills. Intelligence exists in many forms, but is the concept of "intelligence" enough for us to judge the intellectual ability of any given individual and determine the source of this ability? A creative

individual may be considered intelligent in respect their creativity but may not be intelligent in respect to the sciences. Another individual may be considered academically intelligent but may lack physical and creative intelligence. It is difficult for us to determine whether or not an individual is intelligent and whether this intelligence is biological or developmental.

Another key term in this essay is innate. The Oxford dictionary defines innate as inborn and natural. However, when defining this term in a scientific manner it is hard to congest it in to two words. Scientifically, this term is used in multiple dissimilar ways. Generally, innate behaviour is seen as being determined by internal factors while the environment drives acquired behaviour. As mentioned by Gray, R. D (1992) there are at least seven different ways in which the term “ innate” might be used. The problem of these multiple meanings is only little, the bigger problems appear as people use evidence for one definition of innateness to involve to another (Gray, 1992). It means different things to different people and due to this there is a lot of confusion as to what the term actually means, limiting us to categorise certain aspects as being innate or acquired. Innateness can be perceived from various views and these will be discussed further along in the essay.

The debate discussing whether or not intelligence is innate has existed for many years and in turn many studies have taken place to justify both sides. Some providing justification suggesting that intelligence may be innate. Other studies have taken place in response to justify that intelligence is acquired rather than innate and studies have also taken place to justify that psychological development is due to the interaction between genes and the environment.

As mentioned above, there are various studies that have taken place in order to justify the claim that intelligence is innate. “ Deprived experiments” are a way to determine whether behaviour is innate or acquired. The aim of these experiments is to remove any environmental sources so that the genes can develop on their own without the interference of external factors. From an early stage, subjects were raised in an impoverished environment (Gray, 1992). This environment deprived them of the possibility of learning, practicing and observing the behaviours being experimented upon (Gray, 1992). It was then assumed that if behaviour still developed it must be innate, and if it did not then it must be developed through learning experiences provided by the environment. For example, a songbird can be raised from egg to adult without hearing a member of its own species sing and then be tested to see which song it produces. If the typical song representing the songbird is sung then the song is considered to be innate. Additionally, another approach that suggests innate behaviour is fixed action patterns. A particular pattern is “ released” without requiring any type of input from external factors such as the environment and innate behaviours occur impulsively as “ vacuum activities” when the animal is deprived of specific stimuli (Gray, 1992). In order for these experiments to categorise a trait as innate rather than learnt requires that the experimenter eliminate all possible potential environmental sources. The essay will consider this factor later on in the essay and explain why it is not possible to completely eliminate a major factor such as the environment when considering about developmental science.

Another type of study that has been conducted to provide scientific justification for the claim that intelligence is innate, are twin studies. Twin studies indicate, “ both intelligence and brain structure are due to high heritability and that intelligence and brain morphometry are influenced by shared genetic factors” (Wallace, et al., 2010). These studies enable researchers to observe the contribution of genetic or environmental factors towards the development of intelligence. Twins that are reared apart (either monozygotic or dizygotic) share a large amount of genes (100% if they are monozygotic identical twins and 50% if they are fraternal dizygotic twins) but differ in their environments (Wallace, et al., 2010). A study of the Minnesota twins supports the view that genetic factors significantly affect all mental abilities of an individual. The Minnesota Study of Twins Reared Apart was based on the verbal, perceptual and image rotation model of the structure of mental abilities of the twins (Bouchard, Lykken, McGue, Segal, & Tellegen, 2001). The results of these studies and the presence of correlations strongly support the claim that intelligence is innate. All though these correlations exist and may support the claim, there is still a limitation to this study. This being that correlation does not in any way suggest causation. Another limitation is that even though twins that are reared apart share a different environment, they shared the same environment inside their mother’s womb. The presence and sharing of this environment may or may not have strongly influenced the intellectual ability of the twins in the respected areas of the study. Another factor to take into consideration is that all though these twins seemingly are reared apart, there may be similarities present in their environments. And these should be taken into account when concluding whether or not intelligence is innate.

Another study done in order to justify intelligence as innate is done on mathematical concepts. In historical claims for nativism, mathematics is a definitive example of innate intelligence (Cruz & Smedt, 2010). This study was done in order to determine the connection between the genetic skills that an individual may possess and universal mathematical concepts. Their discussion surrounds the idea that mathematical skills have a cognitive basis and that this basis provides a foundation for more formalized mathematical knowledge (Cruz & Smedt, 2010). This study observes that infants possess a certain capacity, for example, infants from a few hours after birth can visually discriminate between collections of two and three objects (Cruz & Smedt, 2010). Because this capacity arises so early in development, it is not possible for it to have been learnt through experience. The environment that newborns have spent most of their time in is their mother's womb; this doesn't give them the opportunity to learn to visually discriminate sets with different numbers of items. Therefore this ability is probably innate (Cruz & Smedt, 2010). The experiment itself consists of infants being assigned to a control condition eliminating any expectations that they may have. Puppets were displayed on stage; the screen lowered and pulled up again with only one puppet behind the stage. This means that if infants are able to perform basic arithmetic problems then they should figure out that there should be two puppets behind the curtain, taking a longer time to analyze the situation. A difference in looking time between correct and incorrect outcomes has been observed in this study. This is attributed to the capacity of an infant's ability to discriminate between correct and incorrect arithmetic operations (Cruz & Smedt, 2010). This study justifies that while or knowledge of numbers is learned, the cognitive capacity that enables them to learn

them is innate. This suggests that our genotypes and the environment may be interacting together to produce our phenotypes.

From the performance view we can observe that it is widely believed that the likelihood of excelling in certain fields depends on the presence or absence of inborn attributes variously labeled “talents”, “gifts” or “natural ability” (Howe, Davidson, & Sloboda, 1999). It is assumed from this perspective, that the innate ability that makes it possible for an individual to excel in certain fields can be detected at an early stage in life. However, from an environmentalist's view, all intelligence is learnt and acquired through the environment. This essay will now expand on this particular view and explore the arguments provided by various entities.

The environmentalist approach represents a view that our intelligence is environmentally determined therefore depending on economic and social factors (Griffiths, 2009). Each individual responds differently to the environment that they live in. Their interaction with the objects around them is different and this is the reason why we are all individually unique. The studies that are mentioned above fail to acknowledge the contribution of social and economic factors towards the intelligence of an individual.

This view suggests that major changes in economic and social factors are associated with relative increases and decreases in intelligence. An example of this is the Flynn Effect. The Flynn Effect displays intelligence changing over time due to environmental factors. Flynn discovered that certain IQ tests – specifically, the Stanford-Binet and Wechsler series – had new and old versions and that both were sometimes given to the same group of people

(Holloway, 1999). Two versions of the same test were given to the same set of children. The children did much better on the 1949 test than they did on the 1974 test. This goes to show that groups perform much more intelligently on older tests. Specifically, Americans had gained about 13.8 IQ points in 46 years. This major change over a short period of time eliminates genetic modification and therefore the environment is considered to be the main cause for this change (Holloway, 1999).

An assimilation of both the performanceist view and the environmentalist view is the interactionist view. Interactionism suggests that both biology and environment interact through out our environment to produce the phenotype (Gray, 1992). It is not innate, nor acquired but instead an interaction between the two that results in our development as human beings. An example that enables to understand the interactionists view is the study based on the moderation of breastfeeding effects on the IQ by genetic variation in fatty acid metabolism. This new focus on research tests how genetic differences moderate the effects of environmental influences on an individual's health and behaviour (Caspi, et al., 2007). This study suggests that children's intellectual development is influenced by both genetic inheritance and environmental experiences. According to the results of this study, breastfed children attain higher IQ scores than children not fed breast milk. The association between breastfeeding and IQ is moderated by a genetic variant in FADS2, a gene that is involved in the genetic control of fatty acid pathways (Caspi, et al., 2007). The difference in IQ test scores between breastfed children and those that are not breastfed was 5.6 and 6.3 IQ points. These results suggest that genetic variation in fatty acid

metabolism moderates breastfeeding effects on children's cognitive development confirming the interaction of genetics and the environment (Caspi, et al., 2007). This study supports a likely pathway uniting the gene, environmental exposure and phenotype.

Another example that also suggests that nature and nurture work together resulting in our phenotype is the Role of Genotype in the Cycle of Violence in Maltreated Children. This study suggests that boys who experience abuse are at a risk of developing antisocial behaviour. The MAOA gene was used to characterize genetic vulnerability to maltreatment and see whether this particular gene modifies the influence of maltreatment on a child's development of antisocial behaviour (Caspi, et al., 2002). Based on this hypothesis scientists tested whether antisocial behaviour would be predicted by an interaction between gene (MAOA) and environment (maltreatment)**.

Between the ages of 3 and 11 years, 8% of the study children experienced "severe" maltreatment, 28% experienced "probable" maltreatment and 64% suffered no maltreatment (Caspi, et al., 2002). The results from this study showed that the effect of childhood maltreatment on antisocial behaviour was significantly weaker among males with high MAOA activity than among males with low MAOA activity. These findings provide evidence that a functional polymorphism in the MAOA gene moderates the impact of early childhood maltreatment on the development of antisocial behaviour in males (Caspi, et al., 2002). This study shows us the strong interaction between biology and the environment and the ways in which this interaction contributes towards our social behaviour.

Conclusively, it is hard to classify a trait as either innate or acquired because there are various internal and external factors contributing towards an individual's developmental growth. The justifications provided for both the performanceist view and the environmentalist view will not be concrete until a scientifically universal definition for the term innate is provided. With the evidence in this studies that this essay consists of, a conclusion can be made that intelligence is neither innate, nor acquired but it is an interaction between internal biological and external factors that leads us to be intelligent.