

IB Extended Essay

14 March 2014

The Inheritability of Intelligence: An Annotated Bibliography

Research Question: To what extent is one's intelligence quotient a result of heredity, environment, or the interaction of both?

Dakwa, Kwame. "The Kallikak Family." *Human Intelligence*. Ed. Amber Esping and Jonathan Plucker. *Human Intelligence: Historical Influences, Current Controversies, Teaching Resources*, 07 Nov. 2013. Web. 04 Dec. 2013.

Kwame's article introduces the claims of psychologist Henry H. Goddard and his studies on the "Kallikak" family. A brief outline of his studies is included before the main subject, Deborah Kallikak, is brought into focus. Kwame uses an academically inclined tone to provide the reader with information regarding Goddard's basis for his claims on the inheritability of feeble-mindedness. Charts and pictures from the original book published by Goddard himself are provided, as well as links to external references to help with further pursuit of the subject. The article includes research on both the Kallikak family and Deborah Kallikak in particular, as well as the controversies that have stemmed from the studies. Kwame also discusses Goddard's own recommendations and subsequent regrets focused on the elimination of those he supposedly deemed "feeble-minded".

The article appears to be a reliable and current source, as the website exhibits signs of constant renovation to all their articles. Although the website is not clearly biased since it provides both the arguments in support of and against Goddard, it does leave out some bits and pieces of information that could potentially mislead the reader. However, the facts that are

provided are reliable and accurate, supported by other articles discovered through further research. The author of the article, Kwame Dakwa, has a Ph.D. in Learning, Cognition, and Instruction from Indiana University. The source can be considered both popular and scholarly, though it appears to be more of the latter.

This article was particularly helpful in regard to my research on the inheritability of intelligence and the supposed lack thereof. It has introduced me to the works of Goddard and instigated further research, which has allowed me access to invaluable resources such as Goddard's own books and records. It is scholarly to the point of being a credible source and was clearly not created simply to gain popularity, but still remains simply worded and comprehensible so one does not have to be a professional psychologist in order to understand the terminology in the article. This article is a general yet specific source; it includes multiple aspects of Goddard's theories and research to give the reader a good level of understanding, with facts specific enough for a good overall comprehension. However, it does not go too far into detail, so readers who are not aggressively pursuing the subject will not become bored or confused. The article did help narrow down the topic of "nature vs. nurture" to "extent of the heritability of intelligence".

Siegfried, Tom. "Origin Of Intelligence Differences Is Gray Area." *Dallas Morning News, The (TX)*, 14 Jan. 2002: *Newspaper Source*. Web. 14 Mar. 2014.

This newspaper article explained a study done by a combined team of researchers from Finland and UCLA. These researchers discovered the inherited brain makeup of certain individuals influences their "g", or general mental ability. The author cites various members of the research team, claiming that "g" is highly influenced by the amount of gray matter in one's brain, and this in turn is strongly dependent on heredity. The article also references the team's

study of twenty pairs of twins, ten fraternal and ten identical. The results were that the brain structure and therefore the amount of gray matter in the brain was under genetic control, though there are possibilities of environmental influences.

This source is extremely valuable, as it details the results of a useful study I would otherwise be unable to obtain without subscribing to a site with a \$225 membership fee. Though it undoubtedly leaves out some of the more complex information, as it is a popular source as well as a scholarly one, it nevertheless provides genuinely practical and intriguing information regarding the stance presented by the researchers. This information is similar to a few of my other sources, but its specificity regarding the structure of the brain makes it a very helpful and reliable source.

Hock, Roger R. *Forty Studies That Changed Psychology: Explorations into the History of Psychological Research*. Upper Saddle River, NJ: Pearson/Prentice Hall, 2009. Print.

This book by Roger R. Hock, a Ph.D. at Mendocino College, contains important studies conducted throughout the history of psychology. Chapters one and four of this collection are particularly useful for my research, as chapter one covers biology and human behavior while chapter four looks into intelligence, cognition and memory. These chapters include details from the Minnesota study of twins reared apart to determine whether or not human behavior and intelligence is inherited or influenced by the environment, as well as a study on how the environment can influence one's brain and make it bigger depending on the amount of stimulation provided.

This source is highly reliable as it covers studies conducted by the most famous and acknowledged psychologists throughout history. There is an abundance of factual information provided, as well as new perspectives and highly analytical insights that make various concepts

much easier to understand. The articles in this book are scholarly and organized in a very structured manner, making the information highly accessible. Moreover, Hock is rather objective when referencing these studies, increasing the credibility of the source and minimizing the risk of bias misleading the reader. This source has not really changed my views on the topic, but was what inspired me to select my topic in the first place.

Calvin, William H. "The Emergence Of Intelligence." *Scientific American Special Edition* 16.2, June 2006: 84-92. *Health Source - Consumer Edition*. Web. 14 Mar. 2014.

This article supports the idea that IQ is a result of the interaction of both heredity and environment, as it takes an evolutionary approach and states that humans have developed certain brain structures over the years in order to accommodate their environments. The author, a neurobiologist at the University of Washington, argues that many environmental factors such as climate may have influenced human ancestors and changed the brain structure of their offspring. This then supports the idea that intelligence is a result of brain structure, but is also impacted by the environment which has a direct influence on said structure. Calvin claims the cerebral cortex, the area of the brain most strongly linked to intelligence, has developed over the years due to environmental influences that allowed it to become four times the size of a chimpanzee's.

The source is useful and fits into my investigation, since it provides new evidence in addition to supporting claims made in other sources. The information is reliable as it is from a credible author, and each generalization is heavily supported by factual evidence. It has not changed my overall view of the topic, but has opened a new perspective that must also be considered.

Machek, Greg. "Human Intelligence: The Role of Standardized Intelligence Measures in Testing for Giftedness." *Human Intelligence*. Human Intelligence: Historical Influences Current Controversies Teaching Resources, Fall 2003. Web. 04 Dec. 2013.

This article discusses the issues surrounding the use of IQ tests in gifted education placement decisions. It includes arguments both supporting and arguing against the use of such tests in order to determine which students are deemed "gifted" and which are not. Machek also includes the inconsistent use of tests as a negative aspect, but agrees such tests have generally been good indicators of academic success.

The source is from the same sponsor as the source above it; thus it is also considered credible for the aforementioned reasons. The research is fairly objective as it provides both sides of the argument, as well as various other facts that could influence a reader to pick a side. The facts are extremely well-documented and referenced, and the author is an associate professor at the University of Montana. The source is more scholarly than popular, though it is still comprehensible to the average reader.

The source does not fit into my research as much now that I have narrowed down my topic, but it was a good reference and helped with my overall understanding of intelligence theories. It is a helpful source in the sense that it introduced me to the various IQ tests and their subsequent uses, but does not help narrow my topic as I have decided on another aspect to focus on.

Sternberg, Robert J., and Elena L. Grigorenko. *Intelligence, Heredity, and Environment*.

Cambridge: Cambridge UP, 1997. *Google Books*. Web. 07 Mar. 2014.

The contents of this book involve the interaction of nature and nurture in IQ scores and researches the origins and transmissions of human intelligence, including many different viewpoints in support of both. This source is particularly useful as it is extremely specific in regard to the theories and strategies it discusses. It includes the most recent perspectives on development and cultural relativism, and is unique in comparison to other sources because it also provides insight to the fallacies and misinterpretations of many previous intelligence studies.

This source is highly objective and credible, as both authors have Ph.D.s from Yale University. The goal appears to be solely to provide information concerning the topic and to prevent the reader from retaining any incorrect or misleading ideas obtained from previous studies. It has helped me shape my argument in many ways, and had a strong influence on my opinion when I first began research on my topic.

Sternberg, Robert J. *Handbook of Intelligence*. Cambridge: Cambridge UP, 2000. *Google Books*. Web. 11 Mar. 2014.

This book, also by Robert Sternberg, details the origins of the intelligence quotient and accounts for all the possible sources of intelligence in general. There is an entire chapter on intelligence and heritability, in which an extremely objective view is taken concerning whether or not the heritability of intelligence is a scientific paradigm. The evidence and subsequent analysis that is provided from each side of the argument is prevalent throughout the book, thus making it a reliable and informative source that has slightly altered my views on my topic.

Hurley, Dan. "Trait Vs Fate." *Discover* 34.4, 2013: 48. *MAS Ultra- School Edition*. Web. 15 Nov. 2013.

This article goes into depth regarding the research of neurobiologist Michael Meaney and geneticist Moshe Szyf, who claim that life experiences can directly influence one's genes. This is highly supportive of other sources that take the stance of IQ being the result of the interaction between heredity and environment. Because the environment can directly influence the genes one inherits, and these genes influence brain structure which has been proven to directly correlate with IQ scores, it can be said that this source is of great importance for the argument that IQ is a result of both nature and nurture. The source is both scholarly and popular, but is beneficial as it gives a detailed account of evidence and analysis as opposed a general summary

of what I have read in countless preceding articles. It also takes a more objective stance concerning the actual evidence presented, as was extremely helpful in contributing to my knowledge of the inner workings of the mind.

M. S.M., B. "Goodbye Nature Vs Nurture Debate." *New Scientist* 207.2778, 2010: 03. *MAS Ultra- School Edition*. Web. 15 Nov. 2013.

The article concerns the debate regarding nature and nurture as separate evolutionary forces, as well as a discussion involving the uncertainty/ambiguity of nature vs. nurture questions. It looks at how the development of intelligence is guided and references the arguments of various geneticists and other experts on the matter. It also supports the claim that IQ is a result of the interaction of both heredity and environment, as the development of many aspects deemed hereditary are influenced by the environment themselves (such as the forming of a fertilized egg). Insight regarding possible reasons for why there are still disputes from both ends of the spectrum today, as well as why it is so difficult to resolve this ongoing debate.

This article is clearly biased, as the writer confidently reveals his/her own opinion. However, this does not invalidate the source, as many useful facts are included as well. Moreover, it serves as a path to many other potentially useful sources through its reference to the various experts and their conclusions concerning the nature vs. nurture debate. The goal of the article is to convince the reader that one's intelligence quotient is due to both factors, and this has been useful in helping me shape my argument. It has not really changed my own opinions on the topic, since I had the same beliefs to begin with, but it is very useful because of the detailed evidence and solid analysis that is used to present the argument.

"Intelligence: More Nature Than Nurture?" *ScienceDaily: Your Source for the Latest Research News*. ScienceDaily, 17 Oct. 2007. Web. 13 Mar. 2014.

This source contradicts many of my other sources by arguing that the human brain is not fully developed at birth, thus leaving a large opening for environmental influences. It supports this claim by arguing that around puberty, the amount of gray matter in the brain begins to decrease while white matter increases, possibly due to environmental influences. However, it is primarily in support of the nature side of the nature vs. nurture debate, as recent findings have shown that in adults, the variation in total white and gray matter volume is 70-90% genetically determined.

The article is very useful as it looks into both hereditary and environmental influences, and also considers clinical implications based on its findings. It offers a stronger counterargument in support of nurture than many of the other sources that lean toward the nature side of the argument, and this is particularly effective in helping the article prove its point. It also brings various new perspectives into the picture, many of which will be accounted for in my extended essay.