

Sacred Heart University

The Neuroscience of Intelligence and Ethical Issues
How the Effect of Genes Can Help Resolve Ethical Dilemmas

Lauren Szczepanowski
Honors Capstone
Professor Rober and Professor Loris
May 13, 2021

Abstract

This paper will explore the issues that arise from intelligence testing because of concerns of racism. The introduction will begin to introduce some of the ethical issues that have arisen from intelligence testing and will also talk about how intelligence is more highly affected by genes than by environment. This is important because it leads to the whole point of the paper that if conducted correctly, intelligence testing should still be credible and not seen as unethical since it is much more highly impacted by genes than environment, so socio-economic status should not matter. The second section will then go into the ethical issues and why the studies have been so highly criticized. In the ethics section, five steps to ensure intelligence testing are ethical are provided. These five steps are important to resolve the ethical issues. They include all participants being aware of all aspects of the study, actively supporting the research, and the study should avoid stereotype threats. The study should also have an appropriate sample and use non-inflammatory language. The main section titled “the neuroscience of intelligence” will go into detail to prove how genetics are the main cause between differences in intelligence and how different aspects like the g factor and the alpha brain ways impact intelligence levels. The paper will then go into how ethical issues can be resolved by this fact that genes have a greater impact because the issue of the difference being between races due to socio-economic status is not relevant or true. Then, it will discuss that once ethical issues are resolved, the neuroscience of intelligence can be used to predict business success in leaders and speaks about emotional intelligence, which is impacted by general intelligence. The paper notes that although the main issue with intelligence studies is since people believe it is impacted by the environment, and therefore socio-economic status, genes are proving to have a higher impact and can resolve ethical issues.

Introduction

Measuring intelligence within human beings is a subject that has been a concern among many people and professionals in the past because of its ethical concerns regarding race. Intelligence is the ability to acquire and apply knowledge and skills. When it comes to the most successful people, they are viewed as having the highest levels of intelligence. Intelligence studies, in the past have been criticized and have many ethical dilemmas surrounding them. This is because there has been an idea that intelligence is greater impacted by nurture over nature, and therefore assumptions are made that levels of intelligence have to do with socio-economic status, and that those of higher income and different races who have more access to resources, may have a greater chance of having higher intelligence.

Recent studies show that genes have a greater impact on intelligence than environment does, and that intelligence is in fact heritable. This is important in resolving some of the ethical dilemmas that are raised because if intelligence is inherited, and environment does not have a big impact on intelligence levels, it proves that intelligence has nothing to do with socio-economic status and shows that when studying the neurobiological bases of intelligence, it is not necessary to measure the difference between races (Gray & Thompson). With the ethical dilemmas being somewhat resolved by the fact that intelligence is impacted more by genes than environment, intelligence studies can then be used to predict important concepts such as business success and the different types of intelligence shown in extremely powerful leaders.

Levels of intelligence and its genetic bases can be used to predict how successful a leader will be. There are differences in moral and emotional intelligence in different levels of leaders and particularly CEOs. Emotional intelligence is important in effective leadership particularly in big businesses. To be socially effective, emotional intelligence is important and in large

organizations, high emotional intelligence can promote effectiveness throughout all levels of an organization (Kerr, Garvin, Heaton, Boyle). In order for large businesses to be successful, leaders and CEOs must have effective leadership strategies and be respected by their employees beneath them, and studies show that those with high emotional intelligence were more effective in having good relationships with their employees and being successful.

Genes play the main role in one's level of intelligence and this fact can help resolve some of the many ethical dilemmas regarding intelligence studies. Intelligence studies must be conducted in an ethical manner and it is not right for assumptions to be made that intelligence differences stem from differences in socio-economic status. From all that is explored above, it leads to the statement that the neuroscience of intelligence can help clear up some of the ethical dilemmas of intelligence studies stemmed from wrongful assumptions being made, by showing that genes have a greater effect on intelligence than the environment does, and it can also predict job success to show why certain leaders are so successful in businesses.

Ethics and Intelligence Studies

Intelligence studies have been highly criticized and debated due to the ethical concerns surrounding them, particularly regarding race. This section will focus on how this can be resolved and how the studies should be conducted ethically. When conducting intelligence studies, it is important that researchers do so in an ethical manner to avoid issues in particular racism. Many people believe that intelligence can be enhanced by participating in certain activities and involving themselves in certain tasks. There are concerns of equal access to methods of enhancing intelligence between people of different races and income levels (Gray & Thompson). Intelligence research has become a field that is viewed as socially alienating because

many studies in the past have compared intelligence between different races and even though this is not most studies that have been conducted, it has created an overall negative outlook on intelligence studies.

In order to avoid racism and ethical concerns within intelligence studies it is important that the target group has given consent to be researched and studied. Particularly when studying potential intelligence differences within different groups consent is important because these studies are important, and it may be worse to censor all research in the differences between groups because the outcomes can be important. Another reason these studies have been seen as unethical is because certain scientists think that the studies are more important than gaining consent from the different target groups. They think it would be more unethical not to explore these potential differences that may exist, even without the consent of participants. This way of thought should be avoided and to clear up some ethical dilemmas with intelligence research, all researchers should ensure to get consent.

The concern of racism involved with intelligence research has harmed some of its credibility. If there is an outlook that all intelligence researchers are racist, the quality of work will be harmed so the main goal should be to “preserve freedom of scientific inquiry while upholding the highest standards of ethical conduct” (Gray & Thompson). To do this in the best way possible, researchers of the neuroscience of intelligence Jeremy Gray and Paul Thompson suggest five standards to be held to when conducting intelligence research. The first is that all of the participants should be fully aware of what is going to be studied and tested, while given the opportunity to drop out of the study if they are not comfortable with it. This is important for the participants to be informed so there are no surprises or room for ethical concerns to arise during

the study. Next, the target groups involved should actively support the research and thirdly the study should avoid stereotype threats such as asking the participants to state their race at the beginning of the study. This would likely alter some of the performance of the subjects in the study because they will think they are being stereotyped from the beginning. Fourth, the sampling of the study must be appropriate and large enough that predictions can be made about the group. This is important because if just a convenient sample is used, it could make false inferences about the whole group, which could lead to unethical assumptions about one group. Lastly, “description of the results should use non-inflammatory language” (Gray & Thompson).

The standards stated above are the key way to ensure intelligence studies keep scientific freedom and also keep the highest of ethical standards. The many ethical concerns of intelligence issues can be resolved if going forward all intelligence tests are performed ethically, and the consent of all target groups is present. The assumption that intelligence levels stem from the environment one is involved in, leads to these ethical concerns because it leads to the research between groups being performed and unless the standards above are included, there is a lot of room for unethical practice. When it comes to intelligence studies involving neuroscience, the more research conducted points to the fact that genes have the most influence on levels of intelligence, which will be explored below.

Neuroscience of Intelligence

The most critical part in understanding intelligence is genetic factors rather than environmental factors. This section will explore how genetic factors ultimately effect intelligence much more than environmental factors, so the concerns of racism and ethical issues can be cleared. When it comes to the neuroscience of intelligence one important part is the g-factor. The

g-factor is the general factor of intelligence, also known as g (Haier 6). When researchers compared different tests that measured different mental abilities, they realized that someone who does well on one test, likely score higher on another test like memory or reasoning. The factors taken from each test all have something in common and that is the g-factor. When someone is tested on reasoning, that has the highest relation to general intelligence (g) at a .96 correlation. When one's reasoning is tested, it is often a good indicator of high someone's g-factor is (Haier 8). Although the g-factor is the highest indicator of intelligence, it is important to note that there are other smaller factors secondary to it that can predict intelligence.

A common misconception is that the g-factor is the same thing as IQ. Rather, IQ test scores are a good basis in determining ones g. This is because IQ tests measure a wide variety of mental factors which all ultimately make up ones' g (Haier 10). Since the IQ test is measuring a wide variety of factors, an important point is that IQ scores could be influenced by social and environmental factors, while the g-factor (general intelligence) cannot.

More important factors of the neuroscience of intelligence include studies regarding alpha brain waves and their frequency and how they relate to intelligence. The book titled *The Neurobiology of Exceptionality* by Cindy Van Rooy, John Song, and Con Stough has a section called "The Neurobiology of Intelligence" which explores these alpha brain waves and their frequencies with intelligence and shows how intelligence levels have a large biological basis. The study in this section concluded that alpha frequency is positively correlated with cognitive performance and "large power in the range of the upper alpha band but small power in the theta frequency range indicate good cognitive performance" (Rooy, Song & Stough 89). Alpha waves represent non-arousals and theta waves represent someone daydreaming as a good example.

These alpha frequencies are much higher in those with good memories and positively correlate to the speed of processing information, all of which are factors in determining the g-factor. The text also examines how those with higher IQ scores have a stronger resting metabolism and engage in more cognitive activity when they are resting than those with low IQ scores. This leads to the idea that more intelligent brains are more efficient and use less energy because they activate fewer neurons when a problem arises (100).

Another important finding in the neuroscience of intelligence is that IQ tests are not test biased like many other tests are. If a test consistently predicts performance wrong, one can assume the test is biased. Although, a test is not necessarily biased due to differences between groups taking the test. IQ tests scores are shown to predict academic success without the influence of socio-economic status, age, sex, or race (Haier 18). This is important because it shows that general intelligence which is influenced by IQ is not altered by environment but is rather genetic. The IQ tests also predict certain brain characteristics a person has such as regional cortical thickness, making them very meaningful in the study of neurobiology of intelligence. Although these IQ tests are important, there are still some limitations with them. A limitation is that intelligence can not be concretely measured and just because one person's IQ is 70 and a second person's is 140, it does not mean the second person is twice as smart as the first (Haier 18). This can become an issue because if someone takes an IQ test when they are sick, the IQ estimate will not be very accurate, and if one takes it again and scores a higher score, it does not mean they increased their intelligence. (Haier 19).

The popular current view on intelligence is in the middle that intelligence stems from both nature and nurture. New studies have been conducted regarding epigenetics, but no results

of them have concluded that environmental factors directly impact human intelligence. It is hard for people to accept the fact that intelligence is based mostly on genetics because people do not want to believe that they do not have as much potential as someone and that their potential is constrained. Proof that genetics make up the level of intelligence in a person stems from many studies including a study that failed to boost IQ by providing more early childhood education. A study was also completed where identical twins were separated and brought back together years later. When the intelligence scores were tested in the twins, they had a correlation of .70, meaning 70% of the variance in intelligence is due to genetics (Haier 50). Arthur Jensen was a very controversial American psychologist who researched IQ scores with “differential cultural bias – as one of his strongest arguments” (Sowell 37). He studied the difference between low IQ disadvantaged children and low IQ middle class children, and his studies had a lot of ethical issues with race and socio-economic status. Although he studied this heritability – environment debate, his outcome still proved that genes had a higher influence on general intelligence. He did another study about siblings being separated as infants and found that “the IQ’s of such children correlate much more highly with the IQ’s of their biological parents than with the IQ’s of the people who raised them” (Sowell 35). Another study of social classes in Poland came to the conclusion that the influence of social policy on humans on mental performance failed to overrule that of genetic factors. (Haier 56).

An important case that proves that general intelligence cannot be improved by the external environment is the case about Mozart and the Brain. Years ago, there was a craze that became popular after being written in a scientific journal that listening to a Mozart sonata for ten minutes could increase ones’ IQ by eight whole points. A test was done to prove this wrong where participants were given three experimental conditions and their IQs were tested after. One

was listening to Mozart's sonata, another was listening to a relaxation tape, and the third was listening to silence. The results did provide that listening to Mozart's sonata had an IQ score 8-9 points higher than the silence condition (Haier 140). This effect though only lasted for 10-15 minutes after testing and the researchers failed to know about the participants respect to IQ or musical experience. This case was "psychometrically naïve" to assume that the three tests could be correlated to one another in any way and to conclude this case the text says, "Whatever the many rich benefits of music exposure and training are, increased intelligence, general or spatial, is not one of them" (Haier 143).

To conclude the section on the neurobiology of intelligence, a study on the g-factor and metabolism/energy is important to bring the idea together. This study concludes an idea similar to what was found above about the efficiency of higher intelligent brains from the book *Neurobiology of Exceptionality* by Cindy Van Rooy, John Song, and Con Stough. This additional study by Tobias Debatin predicted that the g-factor is a type of domain - general mental energy and that the metabolic functions of the brain should be more emphasized in intelligence research (Debatin 201). He argues that this does not go against any idea of neuroplasticity with emergence of the g factor but emphasizes how the biological bases have a greater impact on the g-factor. Adenosine Triphosphate is the chemical energy transporter of organisms and Debatin concluded that, "the g factor is suggested to be seen as an empirical phenomenon that arises because of person – specific biological factors – of which energy production is suggested to be the most crucial one" (Debatin 207). He also concluded that mental energy when in the form of ATP is extremely important when it comes to human intelligence, showing that the genetic effect of intelligence is much higher than thought to be in the past, and should be more accepted as the basis of intelligence. This is important because with everything stated above, it shows how

intelligence is highly impacted by genetic factors, so the socio-economic view on it is not credible, and as long as researchers are focusing on genetic factors, the tests will be ethical. Understanding how genetic factors impact intelligence is important for the human race and can potentially lead to ways to enhance intelligence, which the environment cannot.

Potential to Resolve Some Ethical Concerns

Many ethical concerns regarding intelligence and the study of intelligence stem from the fact that assumptions get made regarding socio – economic status. Many of these assumptions take that position that when people have a higher income, they will have more access to upward mobility such as moving to better areas and accessing better education. It is then assumed that they will have higher intelligence from having more access to resources and there are ethical concerns regarding the study of this and ensuring it is not racist. An alternative way to view this that could resolve some of the ethical concerns along with socio – economic status and intelligence is that people with higher paying jobs already had this high level of g factor and therefore a high level of intelligence, studies have pointed towards the fact that the number one indicator of having a high – paying job is the g factor (Haier 192). When these higher income families then move to nicer areas and their children’s intelligence levels are tested, it is likely their higher intelligence is due to the fact that their parent’s have high intelligence and they inherited it from them. Many studies on evaluating socio – economic status and intelligence have been performed, but they have all failed to argue that intelligence stems from aspects such as family income and education. An important quote showing that socio – economic status does not alter intelligence is “to the extent that different patterns of cognitive strengths and weaknesses are rooted more in neurobiology and genetics than in childhood experience, it is incorrect to

blame lack of economic or educational success entirely on poor motivation, poor education, or other social factors. All of these aspects matter, but with respect to intelligence, they do not appear to matter that much” (Haier 196). This is important because it can resolve some of the assumptions that intelligence is raised through things like income and higher education, because that is where many ethical concerns stem from.

There is an idea that understanding the neuroscience of intelligence can enhance intelligence. This is important to note because many studies in the past have attempted to enhance intelligence through external failures, which shown throughout this paper have all ultimately failed. Although it is evident that certain environmental factors can affect the neuroscience, the genes cannot be altered, and a way to enhance intelligence could stem from understanding this neurobiology of ones’ intelligence genes. Neuro – poverty is focused on the aspects of poverty that stem from the genetic aspects of intelligence. This term is important with the ethical concerns because though it is an uncomfortable topic, it can help explain the cognitive limitations certain people have due to no fault of their own (Haier 197). The book The Neuroscience of Intelligence makes an interesting, yet potentially contradictory claim that, “The uncomfortable concept of treating neuro – poverty by enhancing intelligence based on neurobiology, in my view, affords an alternative, optimistic concept, for positive change as neuroscience research advances” (Haier 197). This is showing how the genes related to intelligence are so important in understanding intelligence, that once they are understood, then it can lead into how environmental factors potentially effect those genes. To enhance intelligence, it is important for these genes to be studied and as long as it is done it an ethical manner, it could ultimately help these ethical concerns related to intelligence and access to resources to help enhance it.

How Intelligence Research Can Help Predict Business Success

Minimizing the concerns of ethical issues that come from intelligence studies is important because intelligence studies can be important in other types of research, particularly what makes a successful leader and how that will ultimately affect the business environment. Although this paper studies the neuroscience of mainly general/academic intelligence, one of the types of intelligence important in predicting a successful leader is emotional intelligence. Emotional intelligence is ““a type of social intelligence that involves the ability to monitor one’s own and others’ emotions, to discriminate among them, and to use this information to guide one’s thinking and actions”” (Romanelli, Cain, Smith). Emotional intelligence has been studied in comparison to general intelligence, and the results have shown that general intelligence can be a predictor for emotional intelligence, so therefore the neuroscience of intelligence can be used to predict emotional intelligence as well. In a study conducted on undergraduates at Kohat University of Science and Technology, a group of random students were selected, and their emotional intelligence was measured with a scale. Then, their cumulative grade point averages were measured, and it was found that self-development, emotional stability, managing relations, altruistic behavior, and commitment predicted the academic success of undergraduates positively (Suleman, Hussain, Syed, Parveen, Lodhi, Mahmood). This study is important because high academic success and achievement is highly predicted by general intelligence, and those who have these high qualities of emotional intelligence proved to have higher academic success and had many of the qualities that make a successful leader.

In another study performed by Lam et al, it was proposed that advanced emotional intelligence was correlated with high individual performance often beyond that of general

intelligence. The researchers examined undergraduate students at a University in the Western United States and the students completed the Multifactor Emotional Intelligence Scale and the Shipley Institute of Living IQ Scale. The participants cognitive based performance was assessed through 8 problems on logical reasoning. The results of this study found that emotional intelligence contributed to individual cognitive based performance over the level attributable to general intelligence. This is important in showing that emotional intelligence needs to be measured against leadership predictability, because to be a successful leader one must have high logical reasoning and high cognitive performance.

The direct correlation between leadership effectiveness and emotional intelligence was studied and this is an important study because a leader's ability to influence the behavior of those following them can strongly correlate to performance outcome of a business. Emotional intelligence has proven to be highly involved with an individual's ability to be socially effective and a key determinant in effective leadership (Kerr, Garvin, Heaton, Boyle). Leaders with highly measured emotional intelligence are the most effective in all levels within a business organization and this is because different levels of emotional intelligence can predict how the leader interacts with their subordinates and those with higher emotional intelligence can have better interactions with those beneath them. They also can monitor how their team members are feeling and ultimately decide to make changes if their employees are not satisfied, because employees will perform their best when they are most satisfied with their job, and this will lead to a successful business. A study was conducted where a leader's emotional intelligence was measured, and then their subordinates were surveyed to rate their supervisor, and the ratings were positively correlated with high levels of emotional intelligence (Kerr, Garvin, Heaton, Boyle). This direct correlation between leadership effectiveness and emotional intelligence is

important because when the neuroscience of intelligence predicts one's intelligence based off genes, it can also predict emotional intelligence, as the two are positively correlated. Emotional intelligence can then be used as a way of measuring leadership effectiveness, and ultimately predicting business success because the leader in the organization will be more effective if they have high emotional intelligence, since they are able to work with their employees better and have better logical reasoning.

Aside from emotional intelligence, general intelligence has also proven itself to be a predictor in job performance in business organizations. IQ scores and the g-factor predict job success, especially when the jobs require complex skills, like leadership roles. Successful leaders when studied have IQs of at least 115, much higher than the average because they need to be able to work with a high level of complexity (Haier 21). This complexity of job performance, which is something all leaders deal with is extremely g dependent. Since it has been shown through this paper that genes have a higher effect on intelligence than environment, ethical concerns can be resolved, so it is reasonable to say that those with higher IQ's should be more highly considered for leadership positions because they will ultimately be the best at complex decision making and help the overall business environment. To bring the ideas of emotional intelligence and general intelligence together with career success and leadership effectiveness a study concluded "findings have shown the incremental validity of emotional intelligence on general intelligence and personality factors when predicting outcomes at work and both extrinsic and intrinsic indicators of career success" (Haro and Castejon 491).

Conclusion

Intelligence testing has been widely criticized due to the ethical concerns among test groups regarding the concern of racial issues. Many of these criticisms stem from the idea that the gap between different levels of intelligence is due to socio – economic status, giving certain groups an advantage at having higher intelligence. Throughout many case studies and research, there is an overwhelming amount of data pointing to the fact that intelligence is much more highly impacted by genes than by one’s environment. Studies show that the g-factor is the main predictor of intelligence along with alpha brain waves. It was proven that intelligence can not be increased through exercises like listening to music and the only differences on scores of intelligence tests were temporary. Those with parents of high intelligence will likely have high intelligence as well as it is proven to be very genetic. The reason many believe it is affected by environment is because those in high paying jobs often have high intelligence scores and they can live in an expensive area, but ultimately their children in that expensive area will have high intelligence scores not because of the high-income area, but because their parents did. This can help resolve a lot of the ethical concerns because it shows that intelligence can not be improved due to socio-economic status, so if the study is done with all the correct guidelines to ensure it is ethical, the study will be credible and accurate. With those ethical concerns resolved, intelligence research can be brought even further because general intelligence can also be a predictor of emotional intelligence, and those with high emotional intelligence will be more effective leaders, which leads to more business success.

There is still a lot of research to be done on intelligence, but the field of study should not be as criticized as it is if the correct guidelines are performed when conducting the study. The research can be extremely beneficial in predicting things like business success and success of the individual. Although intelligence can not be changed, studying those with high intelligence can

help those with lower intelligence because they can try to involve themselves with some of the things that highly intelligent individuals do, to help make certain tasks easier for them. Overall, the neuroscience of intelligence can help clear up some of the ethical dilemmas of intelligence studies stemmed from wrongful assumptions being made, by showing that genes have a greater effect on intelligence than the environment does, and it can also predict job success to show why certain leaders are so successful in businesses.

Works Cited

- de Haro, Jose Manuel, and Juan Luis Castejón. "Perceived Emotional Intelligence, General Intelligence and Early Professional Success: Predictive and Incremental Validity." *Handle Proxy*, Universidad De Murcia. Servicio De Publicaciones, 1 May 2014, hdl.handle.net/10045/37556.
- Debatin, Tobias. "A Revised Mental Energy Hypothesis of the g Factor in Light of Recent Neuroscience." *Review of General Psychology*, vol. 23, no. 2, June 2019, pp. 201–210, doi:10.1177/1089268019832846.
- Gray, Jeremy R., and Paul M. Thompson. "Neurobiology of Intelligence: Science and Ethics." *Nature News*, Nature Publishing Group, www.nature.com/articles/nrn1405.
- Haier, Richard J. *The Neuroscience of Intelligence*. Cambridge University Press, 2020.
- Kerr, Robert, et al. "Emotional Intelligence and Leadership Effectiveness." *Leadership & Organization Development Journal*, vol. 27, no. 4, 2006, pp. 265-279. *ProQuest*, <https://sacredheart.idm.oclc.org/login?url=https://www.proquest.com/scholarly-journals/emotional-intelligence-leadership-effectiveness/docview/226921155/se-2?accountid=28645>, doi:<http://dx.doi.org/10.1108/01437730610666028>.
- Romanelli, Frank et al. "Emotional intelligence as a predictor of academic and/or professional success." *American journal of pharmaceutical education* vol. 70,3 (2006): 69. doi:10.5688/aj700369
- Snyderman, M., & Rothman, S. (1988). *The IQ controversy, the media and public policy*. Transaction Publishers.
- Sowell, Thomas. "Arthur Jensen and His Critics: The Great IQ Controversy." *Change*, vol. 5, no. 4, 1973, pp. 33–37. *JSTOR*, www.jstor.org/stable/40161749. Accessed 11 May 2021.
- Stough, Con. *Neurobiology of Exceptionality*. Kluwer Academic/Plenum Publishers, 2005.
- Suleman, Qaiser, et al. "Association between Emotional Intelligence and Academic Success among Undergraduates: A Cross-Sectional Study in KUST, Pakistan." *PLOS ONE*, Public Library of Science, journals.plos.org/plosone/article?id=10.1371/journal.pone.0219468#:~:text=In%20nuts%20hell%2C%20there%20was%20a,linked%20with%20high%20academic%20success.