Changes in Intelligence

Research Question: To what extent is intelligence malleable?

Exam session:
Extended Essay: Psychology
Name:
Candidate number:
School:
Word Count: 3779

Contents:

Introduction:

When looking at the species which are now present on this planet, many have a particular skill that made it possible for them to survive. Some predators can run extremely fast, some plants can grow in a particular way to catch sun better, us, humans, have intelligence. This leads many psychologists wonder upon this fundamental skill of our everyday life. I find it interesting to investigate a question where controversy is widely present even in the definition itself.

In trying to define intelligence, the psychometric approach is the most reflected (Gross, 2001), as it tackles human differences through tests and examinations as IQ tests. Some psychologists decide to narrow down this broad idea to a general intelligence (Spearman, in Gross, 2001). Others decide to undertake a broader view and observe intelligence from other aspects than just cognitive (Binet & Wechsler, Gross, 2001). On the other hands, some psychologists disagree with the aspect of IQ, as the scores are not necessarily the same as intelligence. Such individuals usually support theories as the Multiple Intelligences. However, in spite of the present limitations of IQ tests, they are still the most used in research as they provide qualitative data, and opponents, as Howard Gardner, have not yet found other alternatives.

Howe (1997) argues that 'raising an individual's intelligence substantially is possible'; yet, it necessitates a significant investment in time and effort. This supports the idea of malleability of intelligence but, it also supports the fact that if such action is undertaken, effort, capital and time have to be invested in it. Evidence exists supporting the malleability of intelligence. For instance, investigations of deprived children which are adopted by loving families have shown significant increase in IQ levels due to the change in environments (Rutter et al., in Gross, 2001). Additional studies evaluating early intervention programs such as those financed by the Head Start initiatives in the 1960s, show solid results supporting the malleability of intelligence (Heber et al., in Gross, 2001).

A vast amount of empirical research and opinions do not support the malleability of intelligence. They rather focus on the genetic aspect of intelligence, repulsing the idea of the environmental factors having an impact on intelligence. Findings from Thomas J. Bouchard and McGue (in Gross, 1994) show a

positive correlation between IQ and genes (for monozygotic twins the correlation is above 0.8 for average IQ). Their experiment supports the idea that the larger the genetic relationship is present between two people, the more similar their IQs are likely to be. However, some studies still contradict the importance of hereditary genes in intelligence. A study has shown that adopted children's IQ can exceed by up to 28 points those of their biological parents, supporting once again the malleability of intelligence.

Considering the research question, 'To what extent is intelligence malleable?'. This paper will be discussing that intelligence is not completely hereditary, and that empirical research suggests that under specific conditions, given enough time, it is possible to improve an individual's cognitive capacity to deal with cognitive complexity, but it requires a radical investment, just like any difficult skill would do (e.g music).

What is intelligence?:

Over the years in our society, there has always been a social status difference between ethnicities or between genders. All of those beliefs are based on the idea that certain groups are superior to others, this lead to the following situation of inequality. Some men have ruled some men have obeyed to orders. Women have stayed home to take care of children while men have faced the world to feed their families. Nowadays we live in a society where most of the people have equal rights. However, the actions and beliefs of certain individuals as Helen Kendrick Johnson and Martin Luther King made the world we live in possible. Those people believed strongly that all men and women are born equal when most spread opinions differed. Intelligence being the main characteristic on which our survival depends, its misjudge can have cavernous repercussions as we can see in history.

The most used way to determine intelligence are IQ tests (in Gross, 2001). This psychometric approach deals with mental measurements. It is based on the belief that there are only two factors that can directly affect the score one gets on mental tests. The general factor which is what all tests have in common and the specific factor which are the unique abilities present in an individual for a particular test. They differ from test to test (Spearman, in Gross, 2001). Spearman and other psychologists weight much more importance on the general factor, as they have discovered a pattern. Individuals with a high general intelligence are more likely to score well in other tests. This contradicts with Howard Gardner' theory that there are multiple intelligences (e.g spacial intelligence, mathematical etc ...) present and that some humans are better in some than others, vice versa. Obviously there is more to intelligence then IQ; yet, it reflects rather well the analytical and verbal skills necessary in life.

As it is impossible to bring in all the factors of intelligence, it is necessary to undertaken a reductive approach. If I were to work with the multiple intelligence theory, this research question would be unsuitable, as there are no possible ways to measure the changes. On the other hand the IQ gives a possible way of measurement which provides a way to process data on people's intelligences, creating a wild range of possible statistical and mathematical implements which facilitate research and brings advances in this new

field. For that reason I choose to use IQ as a way to measure intelligence as I believe it deals in the right way with 'the ability to deal with cognitive complexity' (Gottfredson, 1998).

Moreover it is important to understand the delicacy of this subject as its published results can have large sociological, economical and political impacts, and may leave a significant stain in history. As for instance, if intelligence is seen as a non-malleable entity then why care about the early intervention programs towards poorer social classes.

Intelligence can change:

Many psychologists share the belief that 'an individual's realized intelligence, no matter whether realized through nature or nurture, is not very malleable' (In Gross, 2001). However, there is plenty of evidence supporting the malleability of intelligence. Howe publicly argued that 'The empirical findings provide no support for the pessimistic conclusion that low intelligence and the problems associated with it are inevitable and unalterable'(in Howe, 1998). He supports his arguments with large empirical evidence. One of them are the many studies evaluating the early Head start initiatives in the 1960s. For instance the High/Scope Project, where 123 very poor children who were initially found to have an IQ lower then 80 took part. The comparison is made between two randomly selected groups of children, one which receives a daily preschool program and weekly home visits and the other which undergoes no intervention programs. Findings show that the intervention improved the children's intellectual development, their school grades, and later in life their economic performance (J. Schweinhart et al., 2005) . However, by the end of second grade the IQs of both groups were equivalent. This study has a strong internal validity, and one of the few limitations that can be applied to it would be the argument of reduced quantitative data. Although, this study supports the theory that intelligence is malleable, it also advocates the fact that to make an intervention program successful, effort and time must be invested.

Further findings supporting the malleability of intelligence have emerged from studies investing the effect of varying the amount of schooling young people get. Harnquist (1968) studied a 10% random sample of the Swedish population born in 1948. He had the occasion to compare teenagers, who have comparable IQ, SES, and school grades at the age of thirteen to determine the impact of droping out of school on the IQ He found that, there a was a reduction from 1.8 IQ points going up to 8 IQ points for every high school year that was not completed. This study supports the malleability of intelligence and argues that the environment can have an impact on one's intelligence and that cognitive stimulation is necessary to maintain one's IQ.

Additional empirical evidence, is the Milwaukee project (Heber et al., in Gross, 2001) It was a head start initiative to increase teenager's ability to deal with cognitive complexity. The program started at birth

and continued until school started. The children were divided in half, an experimental and a controlled group. the mothers of the experimental group received significant training into being 'good' mothers. At the beginning of school the ~~experimental~~ group had an average IQ of 120.7, whereas the ~~controlled~~ group had an average IQ of 87.2 (and IQ score of 100 is considered average with a standard deviation of 10-15 points). Throughout the years, their IQ started to correlate more and more. By the age of 10, their IQ scores were respectively 104 and 86. By the age of 14 they were 100 and 90. This experiment reflects the idea that IQ can change and that intervention programs can significantly increase one's intelligence. However, it also indicates the importance of the environment in one's cognitive ability.

Despite the positive attribution's to malleability of intelligence, this research also questions the duration of the improvements of one's intelligence. Leading to one of the main criticism of the malleability of intelligence, the 'fading' objection. Critics such as Hernstein and Murray (in Howe, 1998) argue that IQ gains will diminish over time and in some cases even disappear. Therefore there is no use in the intervention programs as the results will fade over time. Howe (in Howe, 1998) contradicts this theory by arguing that the reason for the fading, is because the cognitive stimulation is not maintained after the intervention program has seized and the results will vanish. He supports his claims by arguing that the children in the Milwaukee project lived in poverty and were deprived psychologically, which are the main factors creating the fading effects. He believes that the environment is of major importance in the development of a child's cognitive abilities, and there are no instant miracle IQ boosts or permanent beneficial changes. However, this evidence indisputably supports the malleability of intelligence. It proves that they are not just bounded to genetics but can have significant ameliorations and de-ameliorations.

Another issue present with the rise of IQ score is the objection of 'failure'. Arthur Jensen (in Gross, 2001) made the assumption that the head start initiatives have failed, and that compensatory education is likely to fail furthermore. He published a set of critics, however, they were made after only two months of the compensatory programs. Which leads many psychologists to wonder what big of a magnitude must the intervention be to cause significant changes. To deal with this issue Howe (in Howe, 1998) compares the amount of time necessary for an individual to acquire a certain set of skills as for instance music and chess.

Findings have shown that for a musical player to acquire reasonable experience as a performer (Part of 8th grade musical board), 3000 hours of instruction and practice are necessary. And equivalent amount is necessary to acquire expertise in other skills such as chess, or various sports. Furthermore, to achieve professional standards in the musical field 10,000 hours of practice and instruction are necessary. Now if we were to compare the amount of time invested in the intervention programs and Ericsson's or Slobada's findings, a significant difference is existent. If we were to assume a typical intervention, four hours a day, five times a week for two months, it would accumulate to no more than 180 hours (in Howe, 1998). In relation with the other duration, there is an obvious lack of time invested in the operation. It would even be surprising if significant ameliorations would have happened.

Furthermore evidence supporting the malleability of intelligence originated from Flynn's studies (in Howe, 1998). By comparing IQs in several countries, Flynn came out with the findings that the IQ in those countries seem to stably grow by approximately 3 IQ points per decade. Those results raise many questions in this branch of psychology. For instance, are we more intelligent than our ancestors or as to why such a growth is present. Flynn tries to explain his findings (in Howe, 1998) by arguing that it is impossible that genetic mechanisms bring about a change from one generation to the other, therefore it must be due to environmental causes. As for instance, a better communication, nutrition, and more exposure to information. Urich Neisser agrees with most of the assumptions made by Flynn; however, he believes that the most accountable factor in the general growth of our IQs is our exposure to more complex visual images (in Howe, 1998). Flynn's effect was furthermore demonstrated by Daley (In Bower, 2003), who made researches on young deprived children in Kenya. He found an 11 point increase in scores between 1984 and 1998. He believes that this is due to the factors that Flynn accounted for as Kenya was undergoing economical development. More specifically due to the reduction of literacy in adults in Kenya leading to more interest in education from the side of the children. Those results support Howe's opinion on the malleability of intelligence, and once again prove that intelligence is malleable under the right conditions (in Howe, 1998).

Criticisms to malleability of intelligence:

Although there is significant empirical evidence present for the malleability of intelligence, the predominant view stays that it is inherited in the most part and has biological basses, and is believed to be relatively difficult to change (McGurk, in Gross 2001). Such view are supported by evidence emitting from different studies that generally undertake the genetic aspect to explain the characteristic of intelligence.

A major study that has received great attention is the Minnezota twins reared apart study. It is considered as a key study in the hereditarily genetic approach to intelligence. It is a review of different studies conducted by Bouchard and Mcgue (in Gross, 1994) on twins reared in different backgrounds. The results have shown an extremely positive correlation in IQ between monozygotic twins (<0.8) which is higher then those of siblings (0.5 in average). In later studies Bouchard has found that monozygotic twins reared apart are more similar in IQ scores then same sex dizygotic twins reared together. Dizygotic twins are as alike in genes as two siblings would be. This research supports the idea that most of our intelligence is determined by our genes; however, it does not refute the malleability of intelligence and the importance of an adequate nurture.

This research provides strong evidence on the importance of heredity genes in one's intelligence. However there are a few limitations to such studies (in Gross, 1994), the twins are meant to be reared apart in different environments, offering the possibility for psychologists to evaluate the importance of genes in the malleability of IQ. However, it is not usually the case, as the adoption companies usually matched the families for twins, leading to no substantial change in environment. This makes this study less ecologically valuable as it does not fully control one of its variable. In addition to that, an another objection present is the idea that the twins have taken different IQ tests leading to a possible errors as the twins might have been tested on different abilities (in Howe, 1998). Furthermore it is possible to argue that the twins were still brought up in the same environment at their birth, which explains the co-related IQ scored (in Howe, 1997). All those limitations refute the consistency of the genetically argument in this issue; however, it does show that intelligence is in part hereditary.

On the other hand, there are studies that contradict the strength of the hereditary argument as for instance the study investigating the variations in IQ of young adopted children. The qualitative findings have shown that, the IQ of some adopted children can exceed those of their biological parents by 20 points (Capron & Duyme, 1989). This sort of evidence creates discussions over the extent to which our intelligence correlates with those of our biological parents, since a high change such as 20 IQ points strongly refutes the argument of the importance of genes and supports the importance on environment (In Howe, 1998). However, this study does not contradict the malleability of intelligence as there has been a significant change.

Responses to criticisms:

Bouchard and Mcgue's study provide strong evidence for the importance of genes in intelligence, despite the few limitations present. However, it was not able to refute the malleability of intelligence (in Howe, 1998). Although their research have shown strong co-relations between the twins even though they were reared apart, it does not contradict the important role of environment, which was not properly overviewed in Bouchard's work (In Gross, 1994).

One of the other criticism that came into question was the fading objection. As explained earlier, it consists in the belief that the changes in IQ will fade away over time. This accusation is supported by evidence that under certain conditions, for instance poverty or insufficient stimulation the changes in IQ will disappear. Moreover the failure objection came into question, as it shows how continuous stimulation is necessary to maintain the beneficial change in IQ. Those criticisms have strong evidence to support it; however, those findings do not refute the malleability of intelligence. It only provides supportive studies to the importance of hereditary genes in IQ, not whether it is malleable.

It is necessary to understand that hasty conclusion do not have its place in this situation as it can have a cavernous sociological and economical impact. Findings must be addressed with care. The media has strong influence on people and if such findings were made to be public, it would have consequences. For instance the publication of 'The Bell Curve' (Murray and Herrnstein) and 'A nation of Morons' (Gould), created heated discussions in the media. As Murray and Herrnstein claimed that intelligence is mostly hereditary and all the money spent on head start initiative is a waste as it will not result in beneficial changes in IQ. This had strong sociological impacts as it was relevant to many people, especially in the working class.

Furthermore the article, 'A nation of Morons' by Gould, shows the possible consequences if one follows the psychometric method mindlessly. This review discusses the study carried out by Yerkes during WW1 and WW2. His findings claim a generalization of the mental age of people through out cultures and ethnicities (e.g Russian :11.34, Italians :11.01, Black men :10.4). However, there were flagrant methodological issues with his study. They contain errors such as a strong cultural bias in the tests

undertaken by the immigrants, most of the questions require a certain educational knowledge in that specific culture. Moreover, tests were undertaken in English and some immigrants could not provide answers, therefore scoring 0. Yerkes overestimated the level of literacy present. Those studies strongly affected the Immigration restrictions to the United States, and people with a higher IQ test were more likely to be welcomed in the country.

Other more modern views as for instance Sternberg argue that there is more to intelligence than just IQ and claim that they are 'convenient partial operationalization of the construct of intelligence, and nothing more' (Sternberg, 1995) . They do not provide the kind of measurement of intelligence that tape measures provide of height." He believes that the IQ test does relate to intelligence; however, it is missing the real life problem situation and performance tests should be implemented.

Conclusion:

From the evidence provided, it is possible to conclude that under specific conditions and with enough time, intelligence (measured as IQ) is in fact malleable. By specific conditions, constant and appropriate educational and emotional stimulation is meant. Permanent gains will not be gained over a short period of time; however, if constant and regular stimulus of cognitive abilities is applied over a long period of time, substantial IQ improvement is likely to be seen. This supports the idea that programs as the Head Start initiative are beneficial, and play a large role in the development of a child's cognitive abilities. Such improvements are flagrant when initiatives as such are applied to poor families, where children are deprived of both psychological and physiological stimulus. It is possible to relate the condition of the starting point to the magnitude of the improvements. The worse the state a child was in, before such programs were applied to him, the more likely he is to show a remarkable cognitive catch up, especially when such children are adopted by caring and loving parents. All of those findings support the idea that men and women do have a certain potential, and when deprived from the nurture necessary to achieve it, one will stay considered as inferior, even though this person has the possibilities to achieve great things. When looking down at our world, it is disappointing economically and morally speaking, to see this numerous children being deprived of their possibilities.

This paper has undertook IQ as a way to measure intelligence. As mentioned earlier, there is more to intelligence then what the IQ tests provide; however, it provided the researchers with the tool necessary to actually permit a conclusion. It is irrefutable that this branch of psychology is likely to grow and new implements and changes will be applied. It is possible that practical tests as mentioned by Sternberg (1998) can be supplemented to the IQ tests, and will provide a more accurate notion of intelligence. Moreover, there are new studies on constant bases that shine a new light on sides to the malleability of intelligence. T.G. Bouchard is working ~~on~~ further ~~more~~ with twins reared apart (in Gross, 2001). As he is in the process of testing large amounts of teens under strict conditions. Those teenagers are given from their earlier ages both psychological and physiological tests. It is believed that they are likely to be asked over 15,000 questions

through out Bouchard's investigation. This is likely to bring on new discoveries on the importance of hereditary genes in relation to intelligence and behavior. Although there are still many answers to be given on the malleability of intelligence, based on the empirical research provided in this paper and IQ as a measure of intelligence, it is possible to conclude that there is no reason to consider intelligence as a fixed entity and further studies may never refute its malleability.

References:

Bouchard, T.J., McGue, M., 1981, Familial Studies of Intelligence: A Review, Science, 212, 1055-1059. In Gross, 1994.

Bouchard, T.J., Lykken, D.T., McGue, M., Segal, N.L. & Tellegen, A., 1990, Sources of Human Psychological Differences: The Minnesota Study of Twins Reared Apart, Science, 250, 223-228. In Gross, 2001.

Daley, T.C., 1984, 1998. In Bower, B., 2003, IQ gains may reach rural Kenya's kids - Harvesting Intelligence - intelligence quotient testing, Science News, vol. 14(3).

Ericsson, K.A., Krampe, R.Th. & Tesch-Römer, C., 1993, The Role of Deliberate Practice in the Acquisition of Expert Performance, Psychological Review, 100, 363-406. In Howe, 1998.

Eysenck, H. J., 1998, Intelligence – A new Look, London, Transaction Publishers.

Flynn, J.R., 1987, Massive IQ Gains in 14 Nations: What IQ Tests Really Measure, Hillsdale, NJ, Erlbaum. In Howe, 1998.

Gould, S.J. (1982) A nation of morons. New Scientist (6 May 1982), 349 - 52

Gottfredson, L.S., 1998, The General Intelligence Factor, Scientific American Presents: Exploring Intelligence, 9(4), 24-29.

Gross, R, 1994, 2nd edition, Key Studies in Psychology, London, Hodder & Stoughton, chapter 35: Bouchard, T. J. & McGue, M., 1981, Familial Studies of Intelligence: A Review

Gross, R., 2001, 4th edition, Psychology – The Science of Mind and Behaviour, London, Hodder & Stoughton.

Heber, R., Dever, R.B., & Conry, R.J., 1968, The Influence of Environmental and Genetic Variables on Intellectual Development. In H.J.Prehm, L.J.Hamerlynck

Herrnstein, R.J. & Murray, C., 1996, The Bell Curve: Intelligence and Class Structure in American Life, with a new afterword by Charles Murray, New York, Free Press Paperbacks. In Howe, 1998.

Howe, M., 1997, IQ in Question: The Truth About Intelligence, London, Sage.

Howe, M., 1998, Can IQ Change?, The Psychologist, 11(2), 69-71.

Howe, M., 1998, Intelligence – some questions answered, Psychology Review, September, pp. 2-5.

Jensen, A., 1969, How Much can we Boost IQ and Scholastic Achievement?, Harvard Educational Review, 39, 1-23. In Gross, 2001.

McGurk, H., 1975, Growing and Changing, London, Methuen, In Gross, 2001.

Neisser, U., 1967, Cognitive Psychology, New York, Appleton Century Crofts. In Gross,2001.

Neisser, U., et al., 1996, Intelligence: knowns and unknowns, American Psychologist, vol. 51, pp. 77-101. In Howe, 1998, Psychology Review.

Rutter, M. (and the English and Romanian Adopteer (ERA) study team), 1998,

Developmental Catch-up, and Deficit Following Adoption After Severe Global Early Privation. Journal of Child Psychology & Psychiatry, 39(4), 465-476. In Gross, 2001

Spearman, C., 1904, General Intelligence, Objectively Determined and Measured, American Journal of Psychology, 15, 201-293. In Gross 2001.

Sternberg, R.J., 1998, How Intelligent is Intelligent Testing?, Scientific American Presents: Exploring Intelligence, 9(4), 12-17.