

Question 11:

One of the defining characteristics of today's western society is the propensity for change and the ushering in of the information age. Knowledge, and subsequently, the facts that comprise knowledge or information, are now the key focus of society. Information is treated as a top commodity and the success of some of the world's largest companies, such as Facebook or Google, are based solely on the trade and accumulation of information. Information has become the basis of power and the repercussions of this trickle down in the daily lives of every individual currently alive. Consider a situation in which a physician is tasked with the unfortunate, yet increasingly common, situation of deciding whether to inform a patient in the diagnosis of their parent with Huntington Disease. A decision such as this will have great ramifications in the lives of every individual involved and brings about a whole host of ethical quandaries.

Current health care policies place a great importance on the respect for autonomy in patient rights. Ideally, a patient has the capacity to make their own informed decisions as to how to approach health care options provided by a health care professional. This concept works well with respect to things such as corrective surgeries or non-genetic disease treatments as any decision will impact only the participant, for the most part. The problem arises when the condition is the result of genetics, due to the genetic similarities of closely related individuals or blood relatives, and the ability to infer genetic information because of the nature of transmission of genes between generations. Respect for autonomy can no longer be solely applied because it is no longer an individual who is being affected. The principles of beneficence and non-maleficence must be examined and considered on top of the principle of respecting personal choice.

The principle of non-maleficence is one of the cornerstones of American health care stating that above all else, do no [more] harm. The important distinction lies within the placement of harm; to whom does the prevention of harm go to? If an individual will not be able to adequately cope with fact that they carry an allele which will eventually cause a fatal disease, then according to the principle of non-maleficence they should by no means be informed of this future. However, should this person wish to have children, they now pose the risk of passing on any diseased allele to their offspring. If the disease is Huntington Disease, then it is fair to say that any future offspring with the disease will be harmed and therefore, under the principle of non-maleficence, it is the duty of a physician to inform their patient about the nature of their genetic make-up. The principle of beneficence can be applied in a somewhat opposite matter to reach the same conclusions.

The principle of beneficence aims to do more good, even if there is a possibility that someone may be harmed. Once again, it is important to note who the principle is being applied to. The future offspring of a person will greatly benefit from any steps their parent takes to

reduce the chances of them being born with a condition that will be debilitating at any point in their life. In this sense, a physician would be benefiting the offspring of a patient by informing them of any genetic diseases they carry and would be justified under the principle of beneficence, even if this information negatively impacts the life of the patient. In any situation, a problem arises when genetic information will negatively impact the life of an already living person, perhaps a re-examination of why this is, is needed.

The basis of the principle of respect for autonomy is that an individual is informed about any decision they will make. In order to make the best possible decision, it is best to first be fully informed about all the parameters involved in a decision. If the decision is regarding reproduction, then an informed decision would require knowing all the potential outcomes of a reproductive event. If a person is unaware of what genes could potentially be passed on to future offspring, they are not making a fully informed decision and therefore respect for autonomy would not be applicable. By extension, a physician would then be justified in informing an individual of their genetic make-up if they are choosing to reproduce.

Advancements in genetics have provided the ability to gain information that was previously thought of as unobtainable. Yet this information comes at a price, for anything learned about the genetics of oneself can have serious implications towards the health of family members. Because of this, great care must be taken when divulging this information to make sure that no one involved is harmed by any genetic information, which is a reflection of the principle of non-maleficence. Definitive solutions to this problem are hard to come by, yet if there was a way to remove some of the stigma associated with the perceived inability to lead a full life knowing that somewhere down the line you will develop a fatal disease, perhaps some progress could be made. After all, we cannot change the genes we were born with so why try and fight the inevitable when you can embrace it.

Question 19:

The outlook for the future of humanity can at times, appear to be quite unsettling, with the looming arrival of new technologies and the myriad of ethical issues that come hand-in-hand with each new technology. Advancements in molecular genetics and reproductive technologies have garnered a great deal of attention from bioethicists the world over and rightly so, for the ethical issues surrounding the field of genetics have far-reaching and broad implications for humanity as a whole. Technologies such as gene therapy will create treatments for diseases that up until that point had been largely untreatable. However, the length of the list of potential benefits stemming from advancements in genetic technologies is matched by the length of time needed to develop these technologies, as they will not be around within the foreseeable future. On the other hand, advancements in applied neuroscience, specifically in brain imaging and brain-machine interfacing, have created technologies that mirror the ethical issues surrounding future genetic technologies. The key difference being that the relatively quiet advances in neuroscience have created technologies that are readily available not in some distant future, but here, today. They bring with them all the same ethical issues to be dealt with and it is this immediateness that warrants concern over the rate at which these issues are addressed.

Recent advances in brain-imaging techniques have allowed for an unparalleled analysis into the structure of the human brain. One technique of particular interest is functional magnetic resonance imaging (fMRI), which measures levels of oxygenated blood in the brain and has become the most influential tool of cognitive neuroscience (Pinel 2011). The importance of this technique lies in its ability to determine a clear representation of both structure and function of the brain, and do so in a non-invasive matter. Studies conducted using fMRI have produced astounding results regarding the nature of human thought, as researchers are now able to determine what word a person is thinking of just by examining fMRI outputs (Kelly 2011). Specific brain structures are now being associated with specific behaviours, and abnormalities in these structures are being associated with abnormal behaviours (Evenson 2003). However, by doing this, the researchers have opened the door to a wide variety of concerns over the applications of any “mind-reading” technology.

Perhaps the most obvious issue surrounding “mind-reading” technology is who should have access to a person’s thoughts. Initially, the possibility of using such a technology by the justice system to determine the guilt of a murderer, rapist or terrorist may seem invaluable in assuring that justice is served to those that deserve it. However, recent findings suggest that a gene mutation unique to child molesters causes a change in the shape and function of the brain, which in turn causes their child molesting behaviour (Evenson 2003). If a child was found to have this particular brain structure, what steps would be taken, if any, to prevent that child from growing up to become a child molester? The implications can be extended even further, into the private sector. If a certain brain structure can be identified with child molestation, then it would not be far reaching to say that the brain structure for lazy or disruptive behaviours could also be identified. Would an employer then have the right to screen any potential employees for the

existence of these particular brain structures? Furthermore, can a person be held responsible for their actions if they are found to have these brain structures? It is when considering the latter question that their deep philosophical implications begin to appear.

In Canadian law, there exists a distinction between ““organic” brain disorders, such as sleepwalking or epilepsy, and behavioural disorders, such as pedophilia” (Evenson 2003). Someone with an “organic” brain disorders cannot be held accountable for any actions caused by their disorder, as their actions are determined by the disorder and not by the person's own choice. Yet, as noted above, researchers are finding more and more evidence suggesting that behavioural disorders stem from a neural abnormality. This speaks not only towards whether or not a person can be held accountable for the actions in a court of law, but towards the fundamental nature of a person's thoughts and behaviours.

Imagine a situation in which the structure and function of the entire human brain is known, down to the role of every last neuron. For example, just by looking at brain imaging of a person, you could tell whether they are hungry or not, what they're hungry for, where they would like to eat and their attitudes towards pickles. Human thoughts and feelings would no longer be an untouchable aspect of the human mind, but a tangible and quantitative aspect of the brain. This would strike a major blow to Cartesian dualism. If human thoughts and feelings are simply a product of the brain and the various structures interacting within it, whose thoughts are they really? Does a person like pickles because they, as a person choose to like pickles or do they like pickles because the brain needs nourishment to continue functioning so it associates feelings of happiness with pickles so you continue to eat them, ensuring its continued survival? If the latter is true, it would result in a huge blow to the perception of human free will.

Richard Dawkins, in his book, “The Selfish Gene” suggests that commonly held belief among evolutionary scientists that the individual is the fundamental unit of selection is not true and instead, the gene is this fundamental unit. The ethical implications of this are vast and great, but the nature of his argument, that the individual is not the unit of selection and therefore the actions of an individual are not based solely on the best intentions of the individual but on the genes contained within the individual, parallels the findings in neuroscience. The structures of the brain that cause a person to behave in a specific way do not simply arise from nothing and arrange themselves due to magical forces. The DNA of an individual provides the blueprint for the construction and organization of the brain. Therefore, if it is deemed that an individual is not responsible for their behaviours because their brain contains specific structures which cause them to act in a certain manner, and these structures are developed in accordance to the DNA of a person, the actual originator of any behaviour is the DNA itself. Of course, this is a bold statement and cannot be fully justified without a complete examination of all the variables surrounding such a statement.

Many arguments can be made against the efficiency of techniques used to determine the data in the studies mentioned, as well as the entire role the brain plays in determining behaviour.

The role of the environment must always be considered when discussing the nature of the human brain. Recent developments suggesting that the human brain is able to grow new neurons in certain situations and change to adapt to new selective pressures suggest that humans are not entirely bound to behave in a way dictated by brain structures or genetics. No brain imaging technique is 100% accurate and sources of error will always find a way into a study. The complex nature of the human brain, the ability to have many thoughts at once and the fact that at any given time there are thousands of neurons firing for a variety of reasons, makes it hard to definitively say that a specific structure is the cause of a thought or behaviour. However, in time, with more precise techniques, these issues will disappear. It is the fact that the development of these techniques is occurring at such an overwhelming pace that the ethics of using them must be fully considered.

Neuroscience and genetics are two fields of study that at first glance, may seem unrelated, but at closer inspection, are seemingly intertwined in previously incomprehensible manner. The methods of obtaining information pertaining to each respective field and the particular items of interest may be different, but the ethical considerations surrounding the implications of the information gained from each field are very similar. Who should have access to information that was once unknowable, such as the thoughts of a person or their DNA sequence? How responsible is a person for their actions? These questions, among others, are posed both by genetics and by neuroscience. Although neuroscience may not be able to answer such questions at the same fundamental level of genetics, the technologies in the field exist now, or will exist in the near future, to begin to answer them. A new frontier awaits humanity as long standing philosophical and ethical dilemmas now have grounds for a solution. We must make haste and solve these dilemmas as there is no more time to sit around and wait for technology to come to us. Technology is already here, at our doorstep and if we take too long, it won't hesitate to let itself in.