If I was given the opportunity, would I go to space?

+ 43 new academic essays from Brilliant Club young scholars in this special edition
What is The Brilliant Club?
Learn about our mission and programmes.

News
All of the latest news from The Brilliant Club.

Research Highlights
Including updates in climate change, developmental biology, astronomy and infection.

Guest Article
Guest article from Professor Tim Leuing, Associate Professor of Economic History, LSE and Former Chief Scientific Advisor, Department for Education

STEM Articles
This term, we hear from scholars in the Science, Technology, Engineering and Maths disciplines on subjects including climate change, internet privacy, machine learning and space exploration.

Arts and Humanities Articles
The Arts and Humanities articles in this edition include topics on Avant-Garde poetry and street artist, Banksy.

Social Sciences Articles
Our social Sciences scholars look at topics such as racial stereotyping and social justice for indigenous minority groups.

The Brilliant Club
The Brilliant Club is an award-winning charity that exists to widen access to highly-selective universities for under-represented pupils. We do this by mobilising researchers to bring their academic expertise into state schools through two core programmes: The Scholars Programme and Researchers in Schools.

The Scholars Programme trains PhD and postdoctoral researchers to deliver university-style courses with rigorous academic challenges to small groups of pupils. These courses begin and end with information, advice and guidance trips to highly-selective universities. Researchers in Schools is a unique teacher training route, designed exclusively for PhD graduates. It provides the training necessary for PhD graduates to become excellent classroom teachers and university-access champions within their schools. Both programmes are designed to support pupils to develop the knowledge, skills and confidence necessary to secure places at highly-selective universities.

The Brilliant Club is building a national movement to mobilise PhD researchers to engage with state schools serving low HE-participation communities. At present, we are supporting over 500 PhD tutors from 30 universities to work with more than 10,000 pupils from over 550 schools across the UK. Through The Scholars Programme, our PhD tutors deliver courses of university-style learning to pupils from Year 5 through to Year 12. The courses they deliver focus on fascinating topics ranging from 'Are Some Infinities Bigger than Others?' to 'Making Maps, Constructing Worlds: Geopolitics and Geography'.

As the diagram to the right shows, The Scholars Programme consists of trips to highly-selective universities, a series of tutorials and the completion of university-style assignments, as well as one-to-one feedback for pupils from their PhD tutors. It is the best of these university-style assignments that are debuted here, in The Scholar. We are delighted to showcase our pupils’ work and celebrate their achievements in the country’s only academic journal dedicated to publishing university-style assignments authored by school pupils. Publishing original work is an important component of academia and it is exciting for us to introduce our pupils not only to the world of research but also to the next stage of publishing in academic journals.
Welcome to a very special edition of The Scholar!

This edition is a bumper pack, containing 44 fantastic articles authored by Brilliant Club pupils. For the first time, it includes work by pupils who completed Uni Pathways, the university access course led by our Researchers in Schools participants. Researchers in Schools is the UK’s only teacher training programme exclusively designed for PhD graduates.

The map to the right shows the locations of all our pupils featured in this edition of The Scholar, including one pupil in Glasgow, Scotland! The Brilliant Club aims to make its programmes available to any school that wants to take part and we are committed to serving rural and coastal areas, as well as inner cities.

In November, the State of the Nation report was released by Government and featured a case study of The Brilliant Club’s work in rural and coastal areas. Of the 10,500 pupils we work with, one fifth are in rural schools. We are very proud of our work in these communities and will continue to work with our partner universities and fantastic tutors to deliver excellent programmes to rural and coastal schools in 2017/18!

Across are some brief updates from The Brilliant Club on our forthcoming podcast, UniTalks; The Scholars Programme and Researchers in Schools.

We hope you enjoy this edition of The Scholar, The Brilliant Club’s academic journal dedicated to the work of state school pupils. If you would like more information on The Brilliant Club and how you can get involved, please visit our website at www.thebrilliantclub.org or send an email to hello@thebrilliantclub.org. Thank you!

The map above shows the locations of all pupils featured.

News from The Brilliant Club

Scholars Programme pupils now benefit from an extra feedback tutorial

Pupils on The Scholars Programme are now able to attend an additional one-to-one feedback session with their PhD Tutor! Research and evaluation conducted by the Research and Impact Department at The Brilliant Club has demonstrated that the additional feedback session supports pupils to attain the most value from their university-style learning experience.

The Scholars Programme team are busy working with schools and tutors to make sure that as many pupils as possible get to take part in the programme in the spring and summer terms. We are now almost fully subscribed for 2017/18 so if you are a teacher interested in running The Scholars Programme in your school, do get in touch as soon as possible with the relevant contact below:

Scotland and the North of England  Dr Natalie Day natalie.day@thebrilliantclub.org
East of England  Lucy Preston lucy.preston@thebrilliantclub.org
South of England  Steph Hamilton steph.hamilton@thebrilliantclub.org
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Wales  Greg Scannell greg.scannell@thebrilliantclub.org

Our Researchers in Schools programme is now recruiting for its 2018 cohort!

Researchers in Schools is a unique teacher training and development programme. It is specifically designed to utilise the academic expertise of PhD graduates for the benefit of pupils, schools and universities.

We are now recruiting PhD graduates to join our 2018 cohort! This year we are excited to announce that we are working to significantly increase the number of participants training to teach subjects other than maths and physics. While we have focused on these subjects historically, we are now recruiting participants in English, history, geography, languages and the other sciences. We aim to place participants into non-selective state schools in all areas of England.

If you would like to learn more about training to be a teacher with Researchers in Schools, please visit www.researchersinschools.org.

The Brilliant Club announces its new podcast, UniTalks

The Brilliant Club is preparing to release its new podcast UniTalks in January 2018! Created in collaboration with the Institute of Arts and Ideas, UniTalks aims to answer many of the questions that pupils may have about applying to and studying at university. Aimed at Key Stage 4 and 5 pupils thinking about applying to university, the podcast will see Brilliant Club pupils interrogate leading thinkers from the UK’s best universities about their subjects and academic experience.

UniTalks will also feature a university agony aunt section, where the admissions team at King’s College London will answer questions submitted by pupils from across the country, covering topics like university finances, choosing a course and moving out of home.

We believe the podcast will be an exciting resource for pupils and teachers so do look out for UniTalks in 2018!
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Research Highlights

Climate Change

Lasting heavy rains to come

The volume of rain produced by individual storms is projected to rise in the coming years thanks to global warming. Rainfall is expected to become more intense in a warming world, but how the duration of discrete events might change has not been clear. David Neelin at the University of California, Los Angeles, and his colleagues used a global climate model and statistical theory to analyse how the upper limit of water accumulated in individual rainfall events might change in a warming climate. They found that if temperatures rise by 3°C above preindustrial temperatures, the probability of the largest regional precipitation events observed in the past increases as much as tenfold in most regions. By the end of the century, unprecedented accumulation of rain water could pose a challenge to societies’ capacity to adapt to a shifting climate, the authors say.

Developmental Biology

Human–pig embryo made

Human stem cells can integrate into developing pig embryos, a finding that could lead to new ways of growing human organs and studying early human development.

In their proposal, the Centauri, allowing multiple fly-bys of Proxima’s planet. Using

the Sun’s nearest neighbour, which is 1.3 parsecs (4.2 light years) from Earth. Astronomers hope to send a fleet of miniature probes to explore it and the neighbouring twinned stars and may enhance the parasite’s spread. Ingrid Faye at Stockholm University and her colleagues found that the malaria parasite produces a molecule that affects haematopoietic stem cells in mouse embryos by eliminating the development of certain mouse organs — a technique that could be applied to human–pig chimaeras to generate human organs in the future.

How malaria boosts its spread

The malaria parasite produces a molecule that affects red blood cells, luring mosquitoes to bite infected people, and may enhance the parasite’s spread. Ingrid Faye at Stockholm University and her colleagues found that the parasite Plasmodium falciparum produces a metabolite called HMBPP. This stimulates red blood cells to release carbon dioxide and other gases that together attract the Anopheles gambiae mosquito, a major malaria vector. The mosquitoes prefer human blood containing HMBPP, ingesting larger amounts of this than HMBPP-free blood. Mosquitoes consuming malaria–infected blood laced with extra HMBPP also had more parasites in their salivary glands than did those ingesting just infected blood, suggesting that the molecule boosts the insects’ susceptibility to infection. HMBPP altered the expression of certain neural and immune genes in mosquitoes, supporting the idea that the molecule changes mosquito feeding behaviour and immune function to support malaria transmission.

A leisurely way to visit the stars

Plans to explore the nearest star system rely on light sails — reflective panels that are propelled by light. These craft travel so fast that they will have little time to explore their destination, but altering the way the sails are used could help. An Earth-sized planet orbits Proxima Centauri, the Sun’s nearest neighbour, which is 1.3 parsecs (4.2 light years) from Earth. Astronomers hope to send a fleet of miniature probes to explore it and the neighbouring twinned stars of Alpha Centauri. Under current proposals, these laser-propelled craft would take 20 years to reach the stars and zip past them in just a few hours (see Nature 542, 20–22; 2017). But René Heller of the Max Planck Institute for Solar System Research in Göttingen, Germany, and Michael Hippler of Heidelberg–Huy, Germany, say sunlight could be used to slow down a sail-carrying probe, allowing more data about the planet to be collected. In their proposal, the sail would shift direction as it passed Alpha Centauri so that sunlight and the stars’ gravitational pull could slow it down. The probe would then swing into orbit around Proxima Centauri, allowing multiple fly-bys of Proxima’s planet. Using this set-up, a probe would take roughly a century to get from Earth to Alpha Centauri, and another half-century to reach Proxima.

Infection

How malaria boosts its spread

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People talk a lot about tips to get in. My advice is simple: be yourself. No university has a “perfect student” against which they judge all candidates. We know that applicants come in all shapes and sizes, literally and metaphorically.

There is no evidence that playing the cello, or captaining the rugby team, or doing six weeks saving the rainforest in Borneo increase your chances of getting an offer. Universities want clever people — good grades, in sensible subjects, who are interested in the course. There really isn’t much more to it than that.

Universities understand that your school may not have been perfect. I once had a student at LSE who had an A* in maths GCSE, and an A in physics. Indeed, his grades were all over the place. But he had enough A*s that we could tell he was bright and hard working. We judged that his school taught physics badly, and that was why he got that grade. (We were right: his school went into special measures shortly afterwards, and has since improved). So don’t worry if you don’t have a perfect set of grades. Some good ones are necessary, but perfection is not.

Broadly speaking, straight Bs at GCSE (or a mix that averages to straight B) means that you should be looking at a selective, recruiting university. Your school, and others, can give you more detailed advice on what is plausible, given who you are. If you have those grades, don’t just follow your friends, or go to the local university. Rightly or wrongly, employers really care about which university you go to. A degree from a more prestigious university is worth having. Aim high — and good luck!
The climate has always been changing, so humans cannot possibly be responsible for the current climate change. Discuss.

Climate change is when the average weather pattern in a certain region (or, in a global scale) alters. An example of climate change is the strong increase in Earth’s temperature since 1950, which is known as the Great Acceleration [1]. There has been debate ever since the idea of human-induced climate change was introduced could humans really have caused Earth’s climate? Earth’s climate has been fluctuating between glacial and interglacial periods for millennia before humans existed. Therefore, one can ask, if our planet’s climate can change so significantly due to natural phenomena, are we even impacting the climate at all? However, there is plenty of evidence to suggest that natural numbers of climate change is having a substantial effect on our climate. Earth’s climate has constantly changed and evolved alongside our planet. Major changes to the planet have impacted and altered the climate. There are many natural processes that encourage climate change. Volcanic eruptions emit solar radiation from reaching Earth’s surface due to the ash and sulphur dioxide which is released. The sulphur dioxide released during eruptions collects in the atmosphere which will remain in the atmosphere for around two years [2]. The Sun is one of the main natural climate drivers and goes through cycles of giving off different levels of solar radiation due to the number of sunspots that are present on its surface. The movement of the continents and tectonic plates can alter the climate by either creating or blocking ocean currents. Overall, any change of our planet change how close we are to the Sun and therefore the amount of solar radiation that receives. Alterations in ocean currents (such as the Gulf Stream) can be distributed around Earth. Those are just a few natural factors that can greatly impact the climate.

An example of how our planet’s climate has significantly changed, due to natural factors, is the Karoo Ice Age. The Karoo Ice Age (or the Permo-Carboniferous glaciation) occurred on Earth from 360-260 Ma (million years ago). This was during the Palaeozoic era. The climate was extremely cold and a large proportion of the Southern hemisphere was covered in ice. This meant that further plants grew and the cycle continued. This is an example of the positive feedback effect. The introduction of plants to Earth, meant that CO2 levels were decreasing. This is because plants take in carbon dioxide and they also absorb and store it. Carbon dioxide is one of the major greenhouse gases, the more greenhouse gases there are in the atmosphere the hotter the climate gets. Consequently, the reduction of CO2, resulted in an increasingly cold climate across Earth. Due to the fact that the snow and ice (from previous winters) couldn’t melt, the surface froze and snow and ice started to gather and, over time, formed vast glaciers. These glaciers had a very high albedo, which reflected the majority of solar radiation back into space. The combination of low atmospheric levels of CO2 and the high albedo of the ice, meant that temperatures dropped further still and Earth was plunged into an ice age.

However, plants cannot survive in extremely cold temperatures and the majority of water was stored as ice. This means that plants stopped photosynthesising and growing. As the number of plants decreased, the levels of CO2 increased and the Karoo Ice Age was reversed. Overall, the main cause of the Permo-Carboniferous glaciation was the introduction of the first land plants. These altered CO2 levels within the atmosphere, which therefore drastically changed the climate over time. To put this major alteration into perspective, this dramatic cooling happened 360 - 260 million years ago and yet humans only began to appear on Earth between 5 million and 7 million years ago [4]. This proves that our planet is capable of altering its climate without our contribution.

Even though the climate can vary due to natural phenomena, human activity cannot exacerbate or accelerate climate change. One of the main ways in which humans are contributing to climate change, is by increasing the levels of greenhouse gases in the atmosphere. This enhances the greenhouse effect. The natural greenhouse effect is when a layer of greenhouse gases in the atmosphere (which include methane, carbon dioxide and water vapour) trap the radiation emitted from the Earth. Without the greenhouse effect, the majority of solar radiation, and therefore the Sun’s heat, would be reflected back into space. Human activity gives off all of the low albedo in: cattle rearing, cement making, manufacturing, vehicle emissions and the generation of electricity to power electrical appliances are just a few examples of the sources of these gas releases. As the demand for electricity increases, the volume of fossil fuels being burnt to generate this electricity will rise and the amount of greenhouse gases given off when these fuels are burnt will escalate. How can we be certain that the rise in greenhouse gases and specifically CO2 in the atmosphere is a consequence of human activity?

There was a strong escalation in global temperature at around 1950 (see graph below). This coincides with the vast increase in the number of automobiles and factories and power stations across the globe.

Emissions from human activity are having a substantial effect on our climate.

These graphs give evidence to support the suggestion that there is a strong correlation between the increase in atmospheric CO2 levels and the rising global temperatures. Due to evidence such as this, the name Anthropocene was suggested by Paul Crutzen (2000) for a new epoch. In 2011 he said “This name change strengthens the enormity of humanity’s responsibility as stewards of the Earth.” The name Anthropocene describes how humans are now the prime drivers of our climate and how natural processes can contribute (rather than control) the climate. Many geologists believe that the significance of humans driving our climate should be made known and a new epoch (the Anthropocene) should be adopted as a formality. To officially declare a new epoch on Earth, a signal has to be found which will be present in the layers of rock that are currently forming. This will then be distinguishable for future generations to claim the transition into the Anthropocene. Just a few of the signals that the scientists are considering to signify the transition into the proposed Anthropocene are: plastic or aluminium molecules in the rock, radioactive particles from nuclear bomb testing. All of these particles would be evident in the rock formations/deposits. These particles are all from the mid-1900s and the early 21st century, which is when the proposed new epoch will be listed as commencing. A location also has to be determined which will define the commencement of the new epoch (despite the fact that the signal has to be found globally).

When the current climate change is compared to how Earth has warmed and cooled throughout history, it shows that without human interference, there would only be a very slight increase in global temperature rather than the 4°C increase that has occurred since 1860 [8].

When the current climate change is compared to how Earth has warmed and cooled throughout history, it shows that without human interference, there would only be a very slight increase in global temperature rather than the 4°C increase that has occurred since 1860 [8]. One of the main ways in which human activity has contributed to climate change is by increasing the levels of CO2 and the high albedo of the ice, meant that temperatures dropped further still and Earth was plunged into an ice age.

The climate has always been changing, so humans cannot possibly be responsible for the current climate change. This is a common misconception and there is plenty of evidence to counter this belief. While the blame cannot wholly be placed on human activity, the Great Acceleration would not have occurred purely because of natural contributors [1]. Even though natural factors, such as orbital changes and tectonics, have affected the climate, if there is no human activity to continue to do so, they no longer drive the climate. Instead, natural factors have been overtaken by human activity, such as mass manufacturing and transport which rely heavily on burning fossil fuels.

The main cause of the Permo-Carboniferous glaciation was the introduction of the first land plants. These altered CO2 levels within the atmosphere, which therefore drastically changed the climate over time. To put this major alteration into perspective, this dramatic cooling happened 360 - 260 million years ago and yet humans only began to appear on Earth between 5 million and 7 million years ago. This proves that our planet is capable of altering its climate without our contribution.

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Are Bacteriophages a Feasible Alternative to Antibiotics?

The lytic cycle can produce more phages and lyse (break open and kill) the host bacteria cell. The cycle consists of three phases: the first phase, lytic phase, is where the virus is induced, the proteins and DNA are synthesized and put together within the host cell into many new phages. In turn, the cell lyses and these new phages are released causing new phage to find a new host cell. The phage then injects its DNA into a new host cell and the cycle repeats. However, sometimes the phage can slip into the lytic cycle as a result of different factors acting upon the phage. For example, the body’s antibody response to some of the phage proteins has sometimes been known to occur before they can do their job (Summers, 2012) or sometimes they reacted with the substances within the gastric passage ways or with the bacteria’s natural resistance to the phages.

Also in vitro (in laboratory conditions) phages have seemed to work well but when tested in vivo, or in living organisms, they haven’t been as effective and there have been concerns about how effective they might be. It is this lack of knowledge that makes the public unsure of phage therapy (Summers, 2012). Many people who aren’t familiar with phage therapy might think of it as putting a virus inside of you and, to many, this is an uneasy or somewhat scary concept to grasp without the knowledge of what it actually is. If the public aren’t going to warm to the idea of phage therapy, there needs to be more research carried out to prove that they genuinely work on humans, in real life.

Even though there is much evidence that bacteriophages are non-toxic to humans, there is also evidence that there is a slight chance of the opposite. It is said that a rapid induction of phages by the spleen could cause the phages to become more harmful to the patient before treatment (Inal, 2003) could lead to toxic genes being taken in by the body, therefore it is essential to know which type of phages to use as a wrong decision could lead to toxic genes implanted in the body. These genes were discovered in phages in 2002 by Boyd and Davis. The genes that were found were CTX genes or cholera toxins (Inal, 2003) which are extremely harmful to the body. However, there is only a miniscule chance of this actually occurring.

Bacteriophage therapy is extremely flexible and can be modified to the newly mutating or resistant bacteria (Sulakvelidze, 2001). This means that they are quicker to isolate or produce than creating a whole new antibiotic medicine for a newly resistant bacteria as antibiotics take a lot longer to chemically put together than to find a new phage or for an old one to mutate. There is likely to be phage resistance in the future though (Sulakvelidze, 2005) and as there wasn’t much understanding of phages when they first were discovered, or any need for understanding due to antibiotics, there still isn’t much knowledge today and so phage therapy isn’t as advanced yet as antibiotics. However, it is suggested that the original founders of phage therapy were not very thorough and “ sloppy” (Summers 2012), they did not research it properly and “convinced” themselves that it worked because they desperately wanted their idea to work. This shows “wishful thinking” not the scientific evidence which is still being sought for this day (Summers 2012).

In electron micrograph of bacteriophages attached to a bacterial cell, the virus is the size and shape of coliphage T1.
Privacy Enhancing Technologies

Year 9, Key Stage 3

L. Ho, Haberdasher’s Aske’s School, London Supervised by C. Bradley, UCL

Privacy enhancing technologies are services which can boost your security when you are on the internet. This can range from encrypting your messages, finding your personal information or keeping all the data you have secure. One example of privacy enhancing technologies is a mix network. I will be explaining how Tor (a type of mix network) provides security for people who use it, how efficient mix networks are and evaluating whether Tor should be illegal or not.

Tor (short for The Onion Router) [1] is a server, which enables users to go on the internet anonymously. They are used by individuals who want to visit websites without worrying if anyone is tracking them and some people use Tor to have access to the dark web. People who use Tor can browse the internet anonymously by hiding their IP address as they use the mix network. The service takes their IP address and then gives them a random IP address granting them anonymity on the web. Whenever you want to go to a website, there’s never any direct interaction between your computer and that website. As you go to that website, the request is passed through two middle relays (the computer where they pass on the information/request) before reaching the exit relay (the computer, which passes on the information to the website) [2].

When it reaches the exit relay, that request is given to the website and the information the website provides is passed through the chain to the computer wanting to go on it. Mix networks heavily rely on the people using their server; the more people using the server the harder it is to track the different relays. For example, if there were 1 million users currently on Tor it would be incredibly difficult to track where one path is going because there are numerous other paths intercepting it. Since they have a random IP address they can browse the internet without having others tracking them down. Furthermore, when you utilize the mix network you can go to websites that normal search engines, such as google, can’t access. Because they can go to different websites (than normal search engines), their URL are ‘.onion’.

One weakness of Tor is that they don’t encrypt any of the user’s messages. This means if Alice (the sender) sends a message to Bob (the receiver) and someone intercepts it, they can read these messages and share it with the whole world. An example of this occurring was on the 9th of October 2007, when a security researcher intercepted thousands of emails and leaked their messages, usernames, and passwords. The security researcher intercepted all those messages by hosting five exit relays [4]. Because he has done that every time someone sends messages and it goes to the exit relay, he can take that message making sure he can read it and not the receiver (Bob). This news shows that the weak spot in Tor is their exit relay as that’s the one place where the information there is exposed to the whole Tor network and those hosting that exit relay [4]. The fact that Tor doesn’t encrypt their messages lead to thousands of user’s emails being leaked and shows that network has failed to provide good security for their customers.

To improve the security of the Tor network, they should have all the information being transferred encrypted until Bob is authenticated (verifying that it’s the person they are sending it to). Doing this will make the exit relay less weak in terms of security and it could prevent crimes (such as what the security researcher did) from occurring again. For example, with the message being encrypted throughout the different relays, if someone was to intercept the exit relays then they won’t be able to understand the encrypted messages.

When people use normal search engines such as Google, they are on the public network. This makes it easy for people to do a traffic analysis on you (they can see your search history and understand your patterns) when you are on the web [3]. However, when you use Tor all this traffic analysis is stopped. The moment someone sets up Tor, Tor disables all traffic analysis making them able to go on the internet anonymously. Additionally, companies such as Google can sell your data and your pattern on the internet to different companies and third parties [4]. All this information demonstrates how normal search engines have a lot of flaws compared to Tor. With Tor, people’s data won’t be sold off to different companies and they can be safe on the internet. Also, Tor can provide more anonymity in comparison to a PET (Privacy Enhancing Technology) like end to end encryption. End to end encryption encrypts all the messages you send however it has some flaws. For example, end to end encryption can reveal who you are and who you are talking to. With Tor, they can make you (Alice and Bob) anonymous so no one can track you down.

A lot of people use Tor so they can go to the dark web and go onto websites such as silk road. Silk road is a website made in February 2011 and people who went on the website could buy anything from drugs to guns. After a few years, Silk road made a total of $2.6billion but then it got shut down by the FBI [5]. This website that Ross Ulbricht made is an example of how individuals can take advantage of Tor. Originally, Tor was “developed by the U.S. Navy as part of their “individual purpose of protecting government communications” [6]. However, criminals are using it for their personal gain, using Tor to do illegal things on the internet and not get caught. If technologies are used primarily to benefit the US services, they are on the public network. This makes it easy for people to do traffic analysis on you (they can see your search history and understand your patterns) when you are on the web [3]. However, when you use Tor all this traffic analysis is stopped. The moment someone sets up Tor, Tor disables all traffic analysis making them able to go on the internet anonymously. Additionally, companies such as Google can sell your data and your pattern on the internet to different companies and third parties [4]. All this information demonstrates how normal search engines have a lot of flaws compared to Tor. With Tor, people’s data won’t be sold off to different companies and they can be safe on the internet. Also, Tor can provide more anonymity in comparison to a PET (Privacy Enhancing Technology) like end to end encryption. End to end encryption encrypts all the messages you send however it has some flaws. For example, end to end encryption can reveal who you are and who you are talking to. With Tor, they can make you (Alice and Bob) anonymous so no one can track you down.

As well as children, ordinary people can look on sensitive websites, ones that the country may not want people to look at [6]. When they are using Tor, they can go to websites that normal search engines can’t go to, meaning that they can go to those sensitive websites. People can now have a wider understanding of the whole world and can explore more things on the internet. In my opinion, people should have the freedom to read whatever they want so they can have a wider understanding of the world. Therefore, privacy enhancing technologies (such as Tor) can help people to learn more and be safer online.

In conclusion, I think that privacy enhancing technologies such as Tor should be illegal for the public to utilize. This is because Tor is very effective in terms of preventing traffic analysis when the users browse the internet with Tor on. Tor changes your IP address to a random one and when you go to a website you request to go that website is gone through those exit relays making sure there’s no direct interaction between you and the website. Even if Tor doesn’t encrypt any of your messages, many people won’t be needing to communicate to others to do crimes on the web. Meaning, if they went on the dark web and go to websites like Silk road and bought some illegal products then the government will find it difficult to track them down. Tor being easy to download on the internet makes crime rates increase and forces the most protected from the internet as they know how it fully works and dangers of going to certain places on the web. So, if they used Tor, they can go on the internet safely and parents won’t have to worry so much about them. However, if Tor was made illegal then so much information about them would be exposed (such as IP address and hostname) [7].

Bibliography:
[6] ‘Your IP Address is’ http://www.whatsmyip.org/more-info-about-you/ [30/03/2017]
What we have learned from mammmoth fossils and DNA? Could we and should we clone a mammoth?

1. Introduction

1.1 What information have we learned from cloning?

In 1996, Dolly a cloned sheep was created. Dolly was the first mammal created by somatic cell nuclear transfer. In this experiment Ian Wilmut and Keith Campbell and colleagues at the Roslin Institute, part of the University of Edinburgh, created a lamb from an adult sheep’s cells and placed it into an enucleated egg. After 277 attempts they produced one embryo that was cloned in a surrogate mother. The famous lamb, Dolly, was brought into fame soon after she was born on the 5th July 1996. She became a hybrid embryo, in which the research could provide new treatments for diseases such as motor neurone disease that may involve the use of stem cells or small molecule drugs.” (Koralage, 2004)

2. Method

2.1 How is DNA recovered?

DNA is recovered through these steps:

1. A PCR vial containing all the identical DNA molecules is placed in a PCR machine that lowers the polymerase chain reaction temperature after two hours by cooling it down to 65°C.
2. The mixture is heated to 90 – 95°C for around 30 seconds and at this stage the DNA strands are separate.
3. The reactants are cooled down to 50 – 60°C for 20 seconds allowing the primers to bind to a single DNA strand.
4. The mixture is heated to 75°C for a minute. This is the optimum temperature for the DNA enzyme. They then make multiple strands, identical to the original one.
5. After this you simply repeat steps 2 and 4 around 20 – 40 times to get more sequences of the original DNA.
6. This may take up to six hours.

2.2 Cloning procedure

To perform the process of cloning, a scientist will copy a chunk of DNA from a placenta. The piece of DNA is ‘pasted’ into a vector and the organism using restriction enzymes.

The chosen piece of DNA is ‘cut’ from the source organism using restriction enzymes.
1. The piece of DNA is ‘pasted’ into a vector and the ends of the DNA are joined with the vector DNA by ligase.
2. The vector is introduced into a host cell, often a bacterium or yeast, by a process called transformation. The host cells copy the vector DNA along with their own DNA, creating multiple copies of the inserted DNA.

4. The vector DNA is isolated (or separated) from the host cells’ DNA and purified.

3. Ethics of cloning

Savulescu states that he believes that the medical and scientific benefits of research into therapeutic cloning are so great that the moral issue is managed.” There is an overwhelming argument against reproductive cloning, as it is currently practiced – it is unacceptable risky. However, when cloning becomes as safe as other reproductive methods, the arguments against it are weak.” (Savulescu, 2005)

In an article dated 8 July 1995 Alson Abbot wrote that “The European Society for Human Reproduction and Embryology (ESHRE) last week confirmed its view that human cloning should not be used at present for reproductive purposes, but that the development of cloning techniques for therapeutics should not be banned” (Abbot, 1999)

3.1 Recent views on cloning

There has been an article published that discusses scientists claiming they are on the verge of resurrecting the woolly mammoth within two years. Mammmoths became extinct around 4,000 years ago. Speaking ahead of the American Association for the Advancement of Science (AAAS) annual meeting in Boston, the scientist leading the ‘de-extinction’ effort said “The Harvard team is just two years away from creating a hybrid embryo, in which mammoth traits would be programmed into an Asian elephant. Our aim is to produce a hybrid elephant- mammmoth, and we said Prof George Church. “Actually, it would be more like an elephant with a number of mammoth traits. We’re not there yet, but it could happen in a couple of years.” (Devlin, 2017). There are a variety of ethical positions regarding cloning from reading literature I have researched. Cloning of animals has been opposed by animal groups due to the number of cloned animals that suffer from malformation before they die, and while foetal from cloned animals has been approved by the US FDA, its use is opposed by groups concerned about food safety.

4. Could we or should clone a mammmoth?

“Recently there has been growing interest in applying the most advanced embryological tools, particularly cloning, to bring extinct species back to life, with a particular focus on the woolly mammoth (mammuthus primigenuus)” (Fulka, Jr. et al., 2009). On a May morning in 2007, on the Yaral Peninsula in north western Siberia, a researcher named Yuri Khudi discovered a perfectly preserved baby mammoth. The one-month old female is helping scientists to unravel how the extinct ice age giants once lived. The contents of her stomach provide scientists with valuable clues about what she and her fellow mammals ate. Alexei Tikhonov, from the Russian Academy of Science who also helped to study the baby mammoth, added “Lyuba is a complete story, a billion and a half of a fairy tale. When you look at her, it’s hard to understand how she could have stayed in such good condition for nearly 40,000 years.” (Richard Gray, 2017). If we could clone a mammoth, it would be possible to clone an elephant.” I think it would be possible to clone a hybrid if we discovered a living cell from their bones or their mummified bodies. But one problem I have thought over is how they would survive in today’s climate. The woolly mammoth is not a very cold animal. It is much warmer than it was when mammoths roamed the planet freely. Attention would be needed to locate them in a climate in which they thrive, in Russia for instance or the Arctic where conditions would be more suitable. But how do we feed them and get them to act like mammoths, will they already know how to do this? The woolly mammoth went extinct around 4,000 years ago but as they tended to live in the Arctic their bones and potentially some mummies have been discovered in permafrost. If any have a living cell in them we can clone the mammoth, but unfortunately there are no living cells at the moment, once scientists discover this, would it be suitable to let an elephant rear it or would the elephant reject it for looking different to the other herd of elephants? There are a variety of ethical positions when it comes to cloning, those against cloning have concerns that today’s technology is not yet progressed enough to be safe. Reading scientific articles and credited web sources, I discovered there is a lot of different opinions on the whole cloning procedure and I decided to carry out my own research into what my family and friends think are the key aspects of cloning, it is a very complex question with a yes or no answer "Do you think scientists should clone a woolly mammoth?"
How Does Behaviour and the Brain Change During Adolescence?

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Adolescence is the period between childhood and becoming an adult. It is obvious to most people that the body changes a lot during this time, and that behaviour does too. Advances in science and technology in recent times have meant that it is now possible to study the brain and to see how it changes during adolescence as well. This has enabled scientists to see how changes in thinking and behaviour might be linked to brain changes.

In order to discuss how behaviour and the brain both change through adolescence, we need to look at both in more detail. Behaviour is the way that people act. Studies of adolescent behaviour have shown a number of aspects of behaviour that tend to change during the period between age 12 to the mid 20s.

Firstly, adolescents tend to be much more influenced by the behaviour of their peers. Often peer relationships become more important in adolescent years. Teens often respond to peer group pressure. Many teenagers may change their actions, the way they dress or even their views because of what their friends and peers think. This is sometimes good, for instance in a group of friends where good grades are respected, someone in that group may change themselves to get good grades so they look impressive to their friends. This can help everyone in the group to achieve better grades. However, peer influence can also be bad. If someone has a group of friends who are obsessed by things such as drugs or crime, then the person may feel pushed into taking part. Similarly, if someone hangs out with friends who take a lot of risks, then the people in that group may take lots of risks just to impress their friends. In fact, an American study done by the National Institute of Drug Abuse showed that in a driving game adolescents were more likely to take risks if a friend was watching them play than if they were playing the game all on their own. This shows how even one friend can influence behaviour.

Another change in behaviour during this time is that adolescents can experience a lot of mood swings, and can move quickly from being happy to being depressed. They can also get very angry during this period, as they feel more responsible for their actions. The way they dress or even their views because of what their friends and peers think. This is sometimes good, for instance in a group of friends where good grades are respected, someone in that group may change themselves to get good grades so they look impressive to their friends. This can help everyone in the group to achieve better grades. However, peer influence can also be bad. If someone has a group of friends who are obsessed by things such as drugs or crime, then the person may feel pushed into taking part. Similarly, if someone hangs out with friends who take a lot of risks, then the people in that group may take lots of risks just to impress their friends. In fact, an American study done by the National Institute of Drug Abuse showed that in a driving game adolescents were more likely to take risks if a friend was watching them play than if they were playing the game all on their own. This shows how even one friend can influence behaviour.

Scientific advances have helped scientists to learn about the development of the brain. For example, Magnetic Resonance Imaging (MRI) is now possible to study the brain and to see how it changes through adolescence as well. This has enabled scientists to see how changes in thinking and behaviour might be linked to brain changes.

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Another change in behaviour during this time is that adolescents can experience a lot of mood swings, and can move quickly from being happy to being depressed. They can also get very angry during this period, as they feel more responsible for their actions. They tend to begin to draw on their individual experiences and knowledge in order to make decisions, which is something they did not do as children.

Some of the key characteristics of adolescents are mood swings, exploring, risk taking, developing personal identity, peer influence, independence, self-centred attitudes, test-taking rules and boundaries and lastly increased cognitive development.

Scientists were not able to demonstrate the link between changes in behaviour during adolescence and changes in the brain until fairly recently. However, scientific advances and technology have meant that it is now possible to map brain changes.

Most information on changes in the adolescent brain come from Magnetic Resonance Imaging (MRI). This method uses very strong magnets (about 1000 times stronger than the average fridge magnet) to align all the protons in water. Normally the protons are all spinning randomly, when the magnet is turned off they all try to return to the position they were once in. However in some tissues this is easier for the protons to return to normal compared to other tissues. This allows the doctors to see how different areas of the brain are using up the most oxygen. Since the 1990s, MRI has been used to carry out brain mapping research because it does not require people to have injections, surgery, or be exposed to ionising radiation, like some other procedures do. Areas of brain activity can be presented on a computer in a graphic form by colour-coding the strength of signals across the brain or in a specific region. Both these techniques in particular have helped scientists to learn about the development of teenage brains and how they change during adolescence.

Electroencephalography (EEG) uses the small electrical pulses generated by the neurons that make up the brain. The EEG method has also enabled scientists to study teenage brains but it has not been as useful as MRI or fMRI.

Scientists used Magnetic Resonance Imaging (MRI) to carry out brain scans of children as they grew from early childhood to age 20. The scans surprised many people because they gave unexpected results. Studies showed that adolescence is a time when the brain grows and develops a great deal. People used to think
that the brain was fully developed by the end of teenage years however the scans showed that although the brain reaches its full size between the ages of 12 and 14, parts of the brain still continue to develop until the early twenties. The prefrontal cortex (found near the front of the head) is one of the last areas of the brain to change and develop. This part of the brain is responsible for decision-making, planning, and functioning as a ‘conscience’. It is not yet fully developed, teenagers might use another part of their brain called the amygdala to make decisions (this section of the brain is associated with emotions). This explains why adolescents might take more risks and be more impulsive. The studies also showed that over the course of childhood the volume of grey matter (brain tissue) increased and then decreased. They noticed that some of the connections or synapses which were not used over time were ‘pruned’ or cut, and others were strengthened. These changes are influenced by a chemical called myelin. This helps the brain to become more efficient over time and more specialised because it keeps the connections that are used often and removes the unused connections. The pruning of synapses begins at the back of the brain and finishes at the front, this is why the prefrontal cortex is one of the last parts to develop.

The brain tests also discovered that during adolescence, some of the many changes in the brain effect sleep. These changes might explain why teenagers often stay up later at night and then have trouble getting enough sleep. Not getting enough sleep can cause attention problems and lead to sadness and anger. Studies of children and adolescents have found that lack of sleep can increase impulsive behaviour. The proper amount of sleep is crucial to adolescents’ health. It is recommended by the American National Institute of Health that American teenagers get at least 9 hours of sleep per night.[1] A US study published in the Journal of Youth and Adolescence, found that only 9% of adolescents actually get this amount of sleep.[2] It was also found that 20% of teenagers were only sleeping for less than 5 hours a night.[2]

This is often due to many distractions such as TV or the computer. The TV and computer trick the brain to think that it is daytime with the light that they emit, this can delay the production of a hormone called melatonin that causes you to sleep. According to a BBC article[3] it was discovered in a sleep study that teenagers start producing melatonin 3 hours later than adults (at 1 am). It was believed that one reason why teenagers get less sleep, not just because of their actions but because of their bodies as well.

Sleeping is incredibly important for adolescents as it produces crucial hormones needed for growth spurts, the less sleep the teenager gets, the less that they grow. For example, the amount of growth hormone that the brain looks over what happened that day and stores it. It can be much harder for adolescents to remember things if they didn’t get enough sleep. Sleep also allows the brain to organise out lots of important processes that help emotions and learning. Without sleep teenagers can become angrier, and more depressed and are less likely to do well in school.

In conclusion, we can say that adolescence is a period when young people tend to change their behaviour drastically. Some characteristics of adolescent behaviour are mood swings, exploring, risk taking, developing personal identity, peer influence, independence, self-centred attitudes, testing boundaries and lastly increased cognitive development. Although scientists think that changes in the brain might be partly responsible for these changing behaviour patterns, there is evidence to suggest that another study could be done during this period, as their behaviour and what they study can influence the development of their own brain. Sleep is also important during these years as the part of the brain that effects sleep patterns was also found to develop during adolescence. Lack of sleep can influence emotional and intellectual development. Many of the problems that teenagers experience such as those associated with risk behaviour could be linked to sleep. By encouraging teens to adopt positive behaviour and healthy practices, such as getting more sleep. Finally I think it is very interesting to learn that although changes in the brain during adolescence influence behaviour (eg risky decisions), the opposite is also true, as behaviour can also influence the development of the brain (eg synaptic pruning).

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Will we Win the War on Cancer?

Cancer is “a term for diseases in which abnormal cells divide without control and can invade nearby tissues” by the National Cancer Institute. Cancer is in much, much more common than the definition suggests. Cancer can affect the only cells which are immortal and can even disguise themselves as healthy cells, making it nearly impossible for the immune system to target them. This causes various problems, as some treatments have unfortunate side effects due to the lack of an effective way to discern between healthy and cancerous cells.

There are various causes of cancer, including alcohol, smoking, HPV and UV exposure. Smoking causes cancer because it causes cancer cells to be released when it is burned. Carcinogens are chemicals that cause cancer. Normally mutations caused by smoking in, for example, the lung would be repaired, and this would not cause cancer. If the smoking is regular, however, it reaches the point where the mutations become cancerous, as they aren’t repaired or the cell dies not as usual by apoptosis. UV causes cancer as it is a form of radiation which can result in ‘double-strand breaks’ in DNA. If one strand of DNA is broken by radiation or mutation it can usually be repaired. But if the DNA is broken to the point where UV damage can’t be repaired, the DNA may find it difficult to repair if this occurs. Radiations break multiple strands of DNA at once, making it difficult to repair.

Cancer occurs on a cellular level because of mutations in the genetic material inside the cell. The mutated cells are able to evade being killed or having the mutations corrected. The mutations in a cell can cause uncontrolled cell growth, causing tumours. Tumours can be either benign or malignant. Benign tumours do not spread around the body or to any parts of the affected region, whereas malignant tumours do, making them incredibly dangerous.

The three most common types of treatment in clinical use today are chemotherapy, radiotherapy, and surgery. Chemotherapy uses a chemotherapeutic agent to stop rapidly dividing cells from dividing and thus cause the tumours to grow. Chemotherapy is however, one of the treatments that has the drawback of not being able to discern healthy cells from cancerous cells. If chemotherapy is unable to tell which cells to prevent from dividing, all cells which divide rapidly will be prevented from dividing. The side-effects of this are catastrophic and can even result in death. Hair loss, suppressed immune system are all caused by chemotherapy affecting healthy cells. Albeit, the method the immune system uses can be bypassed by cancer cells, the side-effects of having no method are catastrophic. A suppressed immune system can be extremely fatal in the event of an opportunistic infection or even a simple virus like the common cold.

Radiotherapy is an alternative treatment that is sometimes used alongside chemotherapy and surgery and uses radiation to kill cells. It does this in two ways, either by damaging the cell’s DNA using double strand breaks, or by creating ‘free radicals’, which damage cells further. Double strand breaks damage DNA by breaking strands of DNA. If a single strand of DNA is damaged the DNA can easily be repaired. This however, does not apply to double strand breaks, as they are harder to repair because strands have been separated, not just one strand being destroyed. Double strand breaks can cause mutations, which can lead to cancer. This is one of the primary consequences of radiotherapy. Free radicals are atoms which are highly reactive and unstable, because of the amount of electrons in the outer shell. This is dangerous to DNA and cells because they are unstable. The secondary consequence of radiotherapy is that, like chemotherapy, it can disrupt the function of the immune system. This means that sometimes healthy cells inside crucial areas of the body are prevented from duplicating. These cause different amygdala changes on the part of the body affected including localised burning of the skin, nausea, fatigue, stiff muscles and hair loss (NHS direct).

A more sophisticated alternative to radiotherapy is proton beam therapy. A beam of high energy protons are fired at the cancer cells, which kill the cancer cells. Protons kill cancer cells using double strand breaks, in exactly the same way as radiotherapy. The difference is that once the target have been destroyed, the protons stop killing cells. The proton beam is generated using a particle accelerator, similar to the CERN taking place in Geneva. Proton beam therapy, unlike radiotherapy, it poses a risk for future cancers developing, but the risk is reduced.

Cancer is a very serious disease, and the ways to treat it are complicated and varied. Understanding the causes, consequences, and treatments of cancer is crucial to developing effective and less damaging therapies. One of the most promising areas of research is the study of how cancer cells evade the immune system. Understanding how cancer cells escape the immune system can lead to new and improved cancer treatments.

I thoroughly enjoyed my placement at Finchely Catholic School, where the students and staff were very committed and enthusiastic about the work. My time there allowed me to contribute to a variety of very complex topics on the psychology and neuroscience of addiction. This placement was very interesting to learn that although changes in the brain during adolescence influence behaviour (eg risky decisions), the opposite is also true, as behaviour can also influence the development of the brain (eg synaptic pruning).
Life-saving but has one catastrophic downside. A cancer cell can adapt and use a different chain of proteins. As the drug attempts to disrupt the same chain, the cancer cell becomes resistant to the drug and a treatment that was once as a whole becomes futile. Immunotherapy is designed to fix the problems the immune system has with dealing with cancer cells. Cancer cells are able to use markers such as PD-L1 in order to protect themselves from immune cells and antibodies from taking action against the cancerous cells. In order to solve this, anti-PD-L1 drugs, or PD-L1 inhibitors can be used. This means that if a cancer cell has been made in computer security, it is possible these solutions could be adapted to be applied on a biological level.

The most promising advancement technology has to offer is genome sequencing. Your DNA can be uploaded to a computer and analysed for cancer. Cancer Research UK is currently going to a significant amount of time to deliver this solution, and it is promising. Because the root to cancer lies primarily in DNA, the potential of this information is huge. Genome sequencing has already been used to find genes that cause cancer such as the BRCA1 gene that can cause breast cancer. It could also be used to develop personalised medicine, which solves the problem that no two cases of cancer are the same. If the genetics of cells and even how they will react could be predicted, the impact on the war on cancer would be massive.

I believe that current cancer treatments are not effective enough to beat cancer, and if science is truly to find a solution new treatments must be found or current treatments must be improved. Some of the potential treatments which are being looked at may seem reminiscent of something in a science fiction film but are in fact closer than it seems to be achievable. One of these is miniaturisation technology which is being discussed as a futuristic technology used to treat cancer is nanotechnology. Nanotechnology, science, technology and engineering combined between micro and nanometre accuracies according to nanogov. For contrast, a cervical cancer cell is 450 nanometres (μm). Nanotechnology could potentially already have one advantage over chemotherapy, the ability to discern between healthy and cancerous cells, which I think is imperative in the war against cancer.

A cell can resist cancer drugs in various ways. One of these is a mutation in the target site or the drug itself, if the target site in which an interaction between a drug and the cancer cell is made in computer security, the reaction cannot take place. The efflux can also be increased, resulting in a higher amount of the drug being expelled from the cell. If this takes place, the likelihood of an interaction taking place is severely decreased. Another way in which the likelihood of an interaction taking place can be decreased is by reducing influx. If less of the drug is coming in, the likelihood of an interaction is obviously going to be reduced, much the same as if efflux is increased. For this reason cancer treatments don't work for everyone, as every cancer is different in patients and not every drug will work.

To conclude, I believe the war on cancer can’t be won through the current treatments available unless they are radically improved. Radiotherapy, for example, needs a solution which only kills cancer cells, so the risk of contracting cancer in the future as a direct result of radiotherapy is annulled. Various new technologies could play a crucial role in gaining an advantage, such as antibodies or nanotechnology, but the technology is not yet there to make them work. Conventional technology used to treat cancer is nanotechnology. Nanotechnology, science, technology and engineering combined between micro and nanometre accuracies according to nanogov. For contrast, a cervical cancer cell is 450 nanometres (μm). Nanotechnology could potentially already have one advantage over chemotherapy, the ability to discern between healthy and cancerous cells, which I think is imperative in the war against cancer.

In a recent study scientists were able to use neural networks and by showing photos of cancerous and non-cancerous cells to the neural networks, the scientists were able to tell the site of distinguishing between cancerous and non-cancerous cells. This could have a potentially significant impact when combined with other technological developments by Stanford University, a nano-laser capable of destroying cancerous cells. A solution to cancer could be found therefore, by combining the two. The only problem is that miniaturisation technology has not yet developed to catch up with nanotechnology. The world's smallest transistors are only 7 nanometres small, but a processor capable of sending photos off to a server to be analysed and then acting on the result with a nano-laser or alternative method of killing cells would require millions of transistors. Combined with the external hardware (camera, laser, etc) the resulting solution would be far too big to be used in practice at this point.

Besides nanotechnology, technology most probably will play a significant role in the war against cancer. A common example of this are organoids. Organoids are 3D models of organs, sometimes 3D printed, designed in order to test and develop treatments for individual patients. This means that multiple treatments can be tried before actually being used on a subject. This is somewhat reminiscent of horticulture, where an organism in which virus are grown into a fake computer system, so a solution can be found. The model of cancer as a computer virus is actually remarkably accurate. A virus, like cancer, is specialised to avoid detection, multiplies rapidly (some have no viruses), and every virus cell, just like every example of cancer, is different. The body, like a computer, has systems, namely the immune system and apoptosis, to deal with cancer. A lot of research has been made in computer security, it is possible these solutions could be adapted to be applied on a biological level.

The perhaps most promising advancement technology to offer is genome sequencing. Your DNA can be uploaded to a computer and analysed for cancer. Cancer Research UK is currently going to a significant amount of time to deliver this solution, and it is promising. Because the root to cancer lies primarily in DNA, the potential of this information is huge. Genome sequencing has already been used to find genes that cause cancer such as the BRCA1 gene that can cause breast cancer. It could also be used to develop personalised medicine, which solves the problem that no two cases of cancer are the same. If the genetics of cells and even how they will react could be predicted, the impact on the war on cancer would be massive.

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S2, Key Stage 3

Part 1, Question 1

Lasers are science–fictional energy swords originating from the movie Star Wars. They were first created by George Lucas and are considered as the staple weapon of the Jedi; the sword has many functions in Star Wars, for example: fencing, fighting, melting, cutting, stabbing and many more.

When people hear the word light sabers, they often think about the science fiction movie of Star Wars however light sabers may not stay fictional forever. Different physicists, scientists, engineers and extreme Star Wars fans have started to come up with ways of creating real life light sabers. The obvious way of developing light sabers is by using laser technology, although this may not be possible. I am going to first considering all the possibilities and impossibilities of real light sabers then I will go into my opinion. There are some possible ways for creating laser light sabers and YouTube has a lot of tutorials to show how to make them. However, there are only a few Internet posts on the facts and possibilities related to them.

According to Harvard University, photons of light behave like solid objects, meaning that the number one problem of real life and light sabers is that the beam from the light sabers that would have to come to a stop whereas lasers go on forever. You would also need lots of energy and power. As well as there is some visual and audio effect problems. According to Physorgs, ‘a light beam cannot be seen on its side and the light sabers would appear to be invisible’. To include, I agree with those who say that making the light sabers just yet because apart from all the elements holding back the production of light sabers, they can also lead to a big health and safety hazard for example with just a little bit of distraction, you can severely harm the people around you. Perhaps light sabers can become a part of the future with new technological theories of lasers and light or if scientists come up with something more advanced than lasers.

Part 1, Question 2

Pho...
had trouble persuading other scientists and the public to believe that light is a wave. This was mainly due to the fact that most people listened to Newton’s theory.  

Unfortunately, both Newton and Huygens went to their graves without knowing which of them was right. Then, Thomas Young discovered the double slit experiment and proved Huygens’ theory correct. His discovery of an interference pattern between light waves, he proved that light is a wave. Later, Albert Einstein described the phenomenon which is the emission of electrons from metal stimulated with light. The electrons are emitted when the light is shone onto the metal. Due to his discovery, he concluded that light is both a wave and a particle. Max Planck also contributed to the Theory of light. He won a Nobel Prize in 1918 due to his work on the Quantum theory.

The Double Slit Experiment

Thomas Young discovered the Double Slit experiment in 1801. The experiment starts off with one slit and a large board directly behind it. Matter, that is considered as particles, is shot through the slit. It then forms a line parallel to the slit on the board. The same applies with two slits but the matter forms two lines parallel to the two slits. The single slit experiment with waves has the same result as with particles. However, when waves go through two slits, they form an interference pattern which gives a result of multiple lines. When light is shot through two slits, it gives the exact same results as the waves did: when shot through one slit it formed one line on the board and when it was shot through two slits it formed multiple lines.

Light: Wave or Particle

Judging by the results of the double slit experiment, light is considered a wave. However, scientists decided to revisit the double slit experiment. When they did the experiment again the results were the same, light is a wave. Afterwards, they decided to find out the fact that light is also a particle. They examined the way that light behaved, and they noticed that light is not able to be measured as a particle and a wave at the same time.

To sum up, I think laser technology in medicine is very important and that we should promote it. Although light and lasers were not able to cure major killing diseases and it is very important for scientists to understand and discover more on the theory of light and understand how to use it both as a particle and a wave.

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Which Protein is the Key Player in Alzheimer’s Disease?

Alzheimer’s disease is widely known as the most common type of dementia, affecting an estimated 850,000 people in the UK, and in the larger picture, approximately 35.6 million people worldwide, and this is increasing with the aging population. It is a neurodegenerative disease where the symptoms progressively become more severe as time goes on, ultimately leading to the death of neurons in the brain. The disease typically affects one in six people over the age of 80, however, in some circumstances it can affect people younger than 65, accounting for 4% of cases. These are very high and alarming figures and therefore continuing to research the possible causes and finding treatments for Alzheimer’s is vital for everyone. The most widely known effects of the disease are memory loss (beginning in the hippocampus, which is associated with long-term memory), language difficulties, personality or behavioural differences, and visual/spatial/complex disabilities. Scientists have come to a general agreement that Beta amyloid (Aβ) plaques and neurofibrillary tangles are the two abnormalities of the disease, which may lead to the ultimate neurodegeneration that is characteristic of Alzheimer’s. However, the debate around which is the main culprit is ongoing and can be approached in many ways, with extensive studies and scientific evidence.

Beta amyloid (Aβ) is believed to be one of the main possible culprits for the neurodegeneration in the brain of Alzheimer’s patients. Alzheimer’s disease is characterized through many experiments and studies. Amyloid is a general term for protein fragments that the body produces normally; whereas Aβ is a protein fragment which has been snipped by an amyloid precursor protein (APP) which usually plays a vital role in neural growth and repair in the brain. However, the corrupted form associated with Alzheimer’s leads onto the amyloid precursor protein fragments which usually lead to two possible outcomes with different consequences for the cell. Firstly, the beneficial pathway is named the benign pathway, where the APP fragments are processed by normal enzymes. As APP is being embedded into the membrane of the cell, specific enzymes ‘snip’ or ‘cleave’ it into distinct fragments. These enzymes are called alpha–secretase, beta–secretase and gamma–secretase. If there is an over production of Aβ this may lead to amyloid plaques. If the APP fragments are eliminated from the brain, however, in a diseased brain these fragments assemble and form the familiar amyloid plaques, one of the hallmarks of Alzheimer’s plaques.

Phosphorylation of Tau can be regulated by normal, non-pathological factors, but is also the result of Aβ via an impairment of memory breakdown, and the loss of important duties they perform in the brain. This leads to cognitive decline in humans associated with Alzheimer’s.

A study conducted by Harvard University using a mouse strain which was highly receptive to the effects of Alzheimer’s, gave the result that a lack of surface protein positioned close to the synapses would lead to an impairment of memory breakdown, and the loss of synapses, associated with the disease. The results of this study are important, supporting the idea that Aβ has the potential to destroy these receptors, leading to cognitive decline in humans associated with Alzheimer’s.

Mice models can also be used to detect the cognitive effects of Alzheimer’s. Due to the complexity of the disease, transgenic mice have been created to be able to exhibit the major hallmark of the disease. Research by scientists at the Korean University of South Korea have helped to a large extent in understanding how the removal of amyloid plaques can temporally improve the symptoms of Alzheimer’s, shining a light on potential treatments that may be developed in the future. Another study was executed by providing Alzheimer’s affected mice with a small molecule that is able to disintegrate the microtubules in brain cells. This poses the question that numerous scientists and studies are attempting to answer. Which one – Tau or Beta amyloid – has the most significant impact on the brain? The first important factor is to understand the role of the neurodegeneration and cognitive decline. Beta amyloid begins as a soluble molecule, and then bunches up and attaches to the surface of important cells in the brain, and eventually forms plaques as part of the disease process. Alzheimer’s. A study has shown the protein can create a strong bond with receptors of nerve cells, which are then damaged and unable to communicate with each other. The damage extends to synapses with other nerve cells. Synapses are vital to storing memories, the process of thoughts & emotions, and other important duties they perform in the brain. A lack of healthy synapses in the brain leads to the neurodegeneration and memory loss that is associated with Alzheimer’s.
The association between tau and cognitive decline has been a topic of interest among researchers, with some studies suggesting that tau could be the ‘shadow’ of Alzheimer’s disease. However, recent evidence has shown that tau pathology is not specific to Alzheimer’s disease and is found in many neurodegenerative conditions. This raises questions about the role of tau in the development of cognitive decline. Researchers have been exploring the relationship between tau and cognitive decline, with some studies suggesting that tau is a better predictor of disease progression than other markers.

On the other hand, studies have shown that amyloid-b beta aggregation and neurofibrillary tangles may contribute to cognitive decline. Amyloid beta is a protein that is produced by the normal APP process, and neurofibrillary tangles are formed when tau proteins become hyperphosphorylated. The relationship between these two proteins and cognitive decline is complex and not fully understood. Further research is needed to clarify the role of these proteins in cognitive decline.

References
- Delphine Bailly, NEURON 2015, July 2006, David Goodsell
- Pythagoras’ Theorem is used to calculate the Euclidian distance – which is a product of diameter and π, although the weight is then converted to a small number of grams. This provides accurate and precise measures as the objects are small. At first, diameter and circumference was considered. However, diameter is directly proportional to circumference – which is a product of diameter and π, so instead one factor was used and the other, replaced. By placing the same number of coins, they will each represent a cluster, a group of similar coins.

Machine Learning and Big Data: How smart are computers?

Machine Learning and Big Data: How smart are computers?

The aim is to create a k-means clustering algorithm on Python, utilising unsupervised machine learning to classify 50 coins from all over the world into nine homogeneous sets of coins. Over time, especially in the past century, devices and machines have claimed to sort coins, but K-means clustering involves calculating the Euclidian distance between coins and centroids, assigning coins to a centroid, and then updating the location of a centroid by working out the mean position of the coins in its cluster but iterating the process until the centroids no longer move. The solution was programmed on Python and had an error rate of 0.9%.

Introduction

The objective is to sort a random collection of coins from all over the world with a machine learning algorithm. This is when a program develops artificial intelligence by being given past experience data to solve a problem. With the right technique, we could find a way for it to sort coins more efficiently than a human.

In 1911, people proposed ideas that claimed to sort coins quicker than money-handlers. Made by Charles Batford, the coin-separator consisted of trays, and according to the author of the book, could be used in a range of situations without having to handle the coins anymore. This study still shows a good comparison of how tau and Aβ have a different effect on cognitive decline.

My personal opinion of the dominant hallmark of Alzheimer’s had been more focused on Aβ in the beginning because Aβ is specific to Alzheimer’s, whereas tau is present in many neurodegenerative conditions. However, after reviewing different studies about tau and the cognitive effects of it, I am now unsure what to conclude. The study by Melissa Murray and the article in Brain changed my view on the significance of Aβ. Personally, my current conclusion is that together, malfunctioned tau and Aβ both effect the brain significantly. More research will need to be conducted and should not be a ‘myth’ that other proteins more to discover possible treatments for the future.

2. Method

Unsupervised machine learning can be used to classify coins into their subset. This is the opposite of supervised machine learning, where the objects are labelled and you know exactly which cluster the object belongs to – it can be deemed as consistent because you would definitely get the same clustering results.

K-means clustering starts with a random choice of clusters, although it is simpler and easier to work with. Each coin is plotted onto a graph with multiple factors, instead of diameter and weight. To collect a dataset for the random assortment of coins, a micro meter was used to measure diameter and a digital scale for weight as these tools have small increments, milimeters and milimeters respectively (although the weight is then converted to a small number of grams). This provides accurate and precise measures as the objects are small. At first, diameter and circumference was considered. However, diameter is directly proportional to circumference – which is a product of diameter and π, so instead one factor was used and the other, replaced. By placing the same number of coins, they will each represent a cluster, a group of similar coins.

Pythagoras’ Theorem is used to calculate the Euclidian distance, or the hypotenuse in this context. This is the distance between two points in an n-dimensional space, conveyed always by a straight line it is equal to, $\sqrt{(x_2-x_1)^2 + (y_2-y_1)^2}$ where $(x_1,y_1)$ is the x or horizontal difference and $(x_2,y_2)$ is the y or vertical difference between two points. The smallest Euclidian distance to a centroid for each coin would mean that it is in the centroid’s cluster, as it is of a greater proximity.

With each centroid representing a cluster of coins, the mean x and y value would be calculated, creating a new position where the respective centroid is moved to. The general formula is $\frac{x_1+x_2}{2}$, but the specific expression is $\frac{X}{2}$. The x position is the sum of the x values of the
coins in the centroid's cluster, and the same is done for the y position, but with the y values. The process is repeated until the centroids move no more so the coins would remain assigned to the same centroid. The centroids' continuously changing position would keep representative of its cluster. In our case it is applied to coin denomination, it would be very difficult for currencies or large groups as they are less specific and show great difference K-means clustering is completed with a programming software so it can be easily done with more variables or coins.

3. Results
50 coins from all over the world were sorted, and their diameter and weight were measured. There were nine different types of coins from four different countries and currencies. The coins were: UK 10 pence, five pence, two pence, one pence, Canada five cent, Euro 10 cent, two cent, USA penny and dime. Three coins out of 50 were assigned to the wrong centroid, therefore the error rate is 0.6% and 94% of coins were classified correctly. Cluster 1 had the lowest F1 score, of 3/8, proving that it seemed to qualitatively perform the worst. Below is a scatter graph representing the coin data, where the colour denotes the type of coin, and the two factors are weight and diameter.

4. Discussion
The results support the hypothesis, because the coins were effectively sorted as there was a low error rate. Error is bound to happen due to some abnormalities or when the dimensions of a coin are similar to that of a coin of a different type, it may be classed into that cluster. For instance, two 10 pence pieces were classed into the wrong cluster – cluster 7 for the USA dime. Although these two coins had normal diameter, their weight was above two grams whereas the other 10 pence coins had weights less than 1.8. Similarly, all USA dimes had weights in the range of 1.35 mm, unlike the 10 pence coin which is significantly larger – 1.85 mm. Other types of machine learning could be used. Hierarchical clustering could have been used – working from the bottom, all the data would be split into smaller subsets of clusters, and eventually a point is reached where each cluster holds specific data for a coin and there are a hierarchy of clusters. In addition, it does not need to know how many clusters there are which could be useful when there are a great amount of coins and the different types present are unknown. Furthermore, the process is much simpler as there are far less mathematical calculations which can make it easier to carry out.

Supervised learning could have been used, where the program is highly reliant on information already given. The program could be given artificial intelligence by providing the features of a few coins per coin type, and from there, the program should be able to classify any given coin. The more data given the better value will be over time – and would perhaps reduce the need for an algorithm.

5. Conclusions
The hypothesis was to sort coins more effectively using a human as a k-means clustering algorithm, the low error rate of 0.6% of the code supported the hypothesis, therefore the code could be applied as a greater scale with many more coins and variables. In the future, given more time, different approaches could be taken to improve the quality, time taken and most importantly the error rate.

The Simplex Algorithm for the House-cleaning-cookie baking problem: the case of three siblings

Year 10, Key Stage 4
A. Abderashid, Barnhill Community High School, Hayes Supervised by Dr S. Kablisch, Barnhill Community High School

It is four years later and Emma and Tom now have a younger sister Laura and they moved into a larger house. Again, the parents return home in three hours and they can make them happy by either cleaning the house or baking cookies. Both Tom and Laura need supervision by Emma while baking. Like last time, Tom gets awarded if he cleans more than twice the time as Emma does or an hour more than her. Laura gets upset if she cleans longer than Tom and Emma together. They have to clean an area of at most 150 m². Emma, Tom and Laura now clean at rates 0.6 m²/min, 0.4 m²/min and 0.2 m²/min respectively and they bake 0.45 cookies/min, 0.25 cookies/min and 0.1 cookies/min. Every clean square metre makes a happiness contribution of 5.5, every baked cookie of 4. What is the optimal time for the siblings to spend on cleaning and baking?

To start off with, from the information above, we can derive the restrictions of this problem. Let Emma’s time spent cleaning in minutes to be E, Tom’s time spent cleaning in minutes to be T and Laura’s time spent cleaning in minutes to be L.

It is stated that “the parents return home in three hours.” From that fact we can derive that all the variables must have a value smaller than 180, since any value higher would imply that the children would be cleaning after the parents had come home. Therefore, the resulting inequalities are:

1. \( tE \leq 180 \)
2. \( tT \leq 180 \)
3. \( tL \leq 180 \)

It is stated that the children can only clean an area of at most 150 m². So, from this, we can derive that the sum of each child’s cleaning rate multiplied by that child’s contribution of 5.5, every cleaned square metre. Formulating this gives:

\[ \frac{5.5}{60}tE + \frac{5.5}{60}tT + \frac{5.5}{60}tL = \frac{5.5}{60}\text{CE} + \frac{5.5}{60}\text{CT} + \frac{5.5}{60}\text{CL} \leq 150 \]

When we substitute the values of \( \text{CE}, \text{CT}, \) and \( \text{CL} \), we can infer that the optimal point maximises the happiness function. Let the rate: \( \text{bE}, \text{bT} \), for Emma, \( \text{bL} \) for Tom and \( \text{bL} \) for Laura. The happiness contribution for each clean square metre be \( \text{bE} \), and the happiness contribution for each cookie be \( \text{bE} \). The happiness contribution for cleaning would be equivalent to the sum of each child’s rate of cleaning multiplied by that child’s time spent cleaning and also by the happiness contribution of each clean square metre. Formulating this gives:

\[ (tE \times \text{bE} + tT \times \text{bT} + tL \times \text{bL}) = (\text{hE} + tE \times \text{bT} + tL \times \text{bL}) = (tE \times \text{bE} + tT \times \text{bT} + tL \times \text{bL}) \]

Therefore, the resulting inequalities are:

1. \( tE \leq 180 \) or \( 180 - tE \geq 180 - 180 \)
2. \( tT \leq 180 \) or \( 180 - tT \geq 180 - 180 \)
3. \( tL \leq 180 \) or \( 180 - tL \geq 180 - 180 \)

When fully simplified, the happiness function becomes:

\[ H(tE, tT, tL) = 1.5 \times tE + 1.25tT + 0.75tL + 576 \]

Since the Simplex Algorithm requires the problem to be written in standard form, we need to re-write the happiness function and the restrictions so that they are all in standard form. The constraints that we had derived were:

1. \( tE \leq 180 \)
2. \( tT \leq 180 \)
3. \( tL \leq 180 \)
4. \( 0.6tE + 0.4tT + 0.2tL \leq 150 \)
5. \( tE \geq tT \)
6. \( tT \geq tL \)
7. \( 2tE \geq tT \)
8. \( tE + 60 \geq tT \)
9. \( tE + 40 \geq tL \)

It is stated that Emma needs to supervise both Tom and Laura when they are baking cookies. This means that the time spent by Tom or Laura must baking not exceed the time spent by Emma (otherwise she would not be able to supervise her younger siblings). The times spent baking by Emma, Tom and Laura are 180 – tE, 180 – tT and 180 – tL respectively. Therefore the constraints are:
Since the standard form requires them to be equalities, we must introduce slack or surplus variables into each inequality, as well as rearranging the variables, so that all variables are basic. While TE, TT and TL are non-basic, if we set the non-basic variables to 0, we get:

\[ s_4 = 180, \quad s_5 = 180, \quad s_6 = 750, \quad s_7 = 0, \quad s_8 = 0, \quad s_9 = 0. \]

This is not the optimal solution. However, since there are still negative entries in the H-row, this is not the optimal solution.

Now, when we set all the non-basic variables to 0, we get:

\[ s_4 = 180, \quad s_5 = 180, \quad s_6 = 750, \quad s_7 = 0, \quad s_8 = 0, \quad s_9 = 0, \]

\[ s_2 = 0. \]

\( s_2 \) is still equal to zero, which correlates with the fact that the value of H has remained at 576. If we repeat the previous step with this new table, we find that TE is the new entering variable and s6 is the new leaving variable. The pivot element is not equal to 1, so we need to multiply the row of the pivot element by the reciprocal of the pivot element in order to make it equal to 1. In this case, we are multiplying it by 1/6.

Now, that the pivot element is equal to 1, we can add multiples of the row of the pivot element to the other rows in order to reduce all other entries in the pivot column to 0.

This results in the s6 variable becoming basic and the s3 variable becoming non-basic. The s6 variable takes the position of the s3 variable in the B column.

However, since there are still negative entries in the H-row, this is not the optimal solution.

Now, when we set the non-basic variables to 0, we get:

\[ s_3 = 66, \quad s_6 = 66, \quad s_9 = 180, \quad s_1 = 114, \quad s_2 = 114, \quad s_4 = 48, \quad s_7 = 48, \quad s_8 = 60. \]

\( s_2 \) and \( s_7 \) have both decreased to 114, while TL has increased to 180. The value of H has also increased to 1009.8, meaning HT(114, 114, 180) is greater than H(125, 125, 125), despite it not being the optimal solution.

If we repeat the previous step with this new table, we find that sS is the new entering variable and s9 is the new leaving variable.

Incidentally, the pivot element is already equal to 1, so no change is needed to be made to the row. We add multiples of the row of the pivot element to the other rows to reduce all other entries in the pivot column to 0.

This results in the s5 variable becoming basic and the s9 variable becoming non-basic. The s5 variable takes the position of the s9 variable in the B column.

However, since there are still negative entries in the H-row, this is not the optimal solution.

Now, when we set all the non-basic variables to 0, we get:

\[ s_5 = 55, \quad s_7 = 55, \quad s_3 = 75, \quad s_4 = 125, \quad s_6 = 125, \quad s_9 = 125, \quad s_8 = 125, \quad s_2 = 60. \]

\( s_2 \) and \( s_4 \) have all increased by 125 and the value of J has increased to 1001, so HT(114, 114, 180) = 1001.

If we repeat the previous step with this new table, we find that s6 is the new entering variable and s3 is the new leaving variable.

Since the pivot element is not equal to 1, we must multiply the row by the reciprocal of the pivot element, as we have done before. In this case, we are multiplying the row of the pivot element by 6/5.
The Mathematical Modelling of Sea Surface Temperatures in a Warming Climate

Ocean temperatures are rising as a result of our warming climate and this may have profound consequences for all life on Earth. To understand how this is happening and how we might prepare for the consequences, we need to understand this process mathematically. To do this scientists must learn how to perform linear regression analysis.

Here, L. Collins from Priory Academy completes a complex linear regression.

Since $t_E$, and $t_L$ are all basic variables, we can easily add a multiple of each of their rows to the $H_1$-row to reduce the new entries back to 0.

Now there are no negative entries in the $H$-row. Therefore, we must have reached the optimal solution which is:

$$t_E = 90, t_T = 150, t_L = 180$$

For which the happiness function is:

$$H(90,150,180) = 1017$$

In conclusion, Emma should clean for 90 minutes, Tom should clean for 150 minutes and Laura should clean for 180 minutes to maximise the amount of happiness their parents have when returning home.

If the happiness contribution of each square metre was changed by $\delta$, so that the happiness contribution for each square metre become $5.5 + \delta$, it would change the happiness function to:

$$H'(t_E, t_T, t_L) = 1.5t_E + 0.666t_T + 1.2t_L + 0.464t_E + 0.7t_L + 0.285t_L + 576$$

Which can be rearranged to:

$$H' = 1.5t_E - 0.666t_T - 1.2t_L - 0.464t_E + 0.7t_L + 0.285t_L + 576$$

Using the last table from the Simplex Algorithm, we can input these new entries in order to find what values of $\delta$ allow the solution to remain optimal.

The two constraints we have in finding the possible values of $\delta$ are:

$$27/50 + 0.28 \geq 0, 1017 + 1508 \geq 0$$

Re-writing these inequalities so that $\delta$ remains on one side while the constants remain on the other gives:

$$\delta \geq -2.7, \delta \geq -6.78$$

Since having a value of less than -2.7 would breach the first constraint before the second one could even be reached, the second inequality is redundant and can be ignored.

Therefore, $\delta$ can take any value greater than or equal to -2.7 so the given solution still remains optimal.

**PhD Tutor’s note**

It was an absolute pleasure to work with A. Abdereshed due to his ability to quickly form new connections of any new material to what he already knew. He also has an exceptional capability to work independently and has proven numerous times that he can tackle work that has not been fully explained to him. In his final assignment he successfully solved an extension to the problem that had not been discussed and wrote everything in the style of a proper mathematicians answer with stated assumptions and full explanations / reasoning as opposed to a typical A-level student’s collection of uncommented calculations. The high standard of his work was graded 98%.

**PhD Tutor’s note**

Sea surface temperatures across the world have been increasing steadily since the onset of the industrial era, however, fluctuations about this upward trend are clearly visible. These fluctuations are of great interest to climate scientists because they are associated with the natural variability of the climate system, which to this day is still relatively poorly understood. The work of L. Collins at Priory Academy is an outstanding example of how a model for these fluctuations can be formed using linear regression, which is a statistical technique that is employed by much of the academic community, as well as banks and other business, to study relationships between variables. Whilst her work deeply shows that she has an excellent grasp of the mathematics, and the various mathematical routines in Excel, in fact, it is the interpretation of the various components of the linear regression model that stands out. An outstanding piece of work by a dedicated and gifted pupil.
Observation of the Antennae Galaxies using the Very Large Telescope

This is my proposal for viewing the Antennae Galaxies using the Very Large Telescope (VLT), in order to ascertain beneficial scientific research and to further research into other areas of outer space. This proposal will provide facts about the Antennae Galaxies and the VLT, and will express my opinion on why these subjects being viewed will be useful to further work in astronomy.

For this project, the objects I would like to observe are the Antennae Galaxies. These are a pair of interacting galaxies, which are undergoing a collision (the initial encounter of the galaxies being some 200 to 300 million years ago), and are entering a starburst phase, where the rapid formation of stars occurs. These two galaxies are known as the Antennae Galaxies because the two long tails of stars, gas and dust ejected from the galaxies, as a result of the collision, resemble an insect’s antennae. It is estimated that 12 billion years ago, the Antennae were two separate galaxies. One of the galaxies, NGC 4038, was a barred spiral galaxy and the other galaxy, NGC 4039, was a spiral galaxy. Before they collided, NGC 4039 was larger than NGC 4038. 900 million years ago, the Antennae began to approach one another, then 600 million years ago, the Antennae collided into each other 300 million years ago, the Antennae, stars begin to be released from both galaxies. Today the two streams of ejected stars extend far beyond the original galaxies, resulting in their famous anteriore shape. Within 400 million years, the Antennae’s galaxies will collide and become a single core with stars, gas, and dust around it. Observations and simulations of colliding galaxies suggest that the Antennae Galaxies will eventually form one elliptical galaxy.

Not only will the observation of these new stars benefit further scientific research into how our universe works, but these two colliding galaxies portray a likely future for our galaxy, when our nearest neighbor, Andromeda, hits our Milky Way. The observation of these galaxies will provide insight into the future of our own, and can help astronomers to understand how these collisions benefit the rapid formation of stars.

The telescope that I would like to use to view these galaxies is the VLT. I would use the VLT’s infrared wavelength to view the galaxies. This telescope is located in Chile. With optimum weather conditions and right placement on the Earth to view the correct part of space that houses the Antennae Galaxies, the VLT proves to be the best telescope for viewing them. The high-resolution images that the VLT provides of these galaxies will allow astronomers to differentiate between stars and super star clusters that were created in the collision of the two spiral galaxies.

By observing these galaxies, discoveries can be determined such as that the majority of super star clusters formed during the starburst phase, with individual stars becoming part of the background of the galaxy. However, it is estimated a hundred of the massive clusters will survive to form regular globular clusters, similar to those found in our own Milky Way galaxy.

Scientific rational
I chose this object, not only because it is very likely the future of our galaxy when it collides with Andromeda, but also because it provides interesting scientific information. The age of these clusters differ to the age of most known globular clusters and the rate of star formation is so unusual that the Antennae Galaxies are in a state of starburst, a period in which all the gas within the galaxies is being used to form stars. This process will not last forever and neither can the separate galaxies, meaning eventually the nuclei will merge, making the start of the galaxies remaining in partnership together as one large elliptical galaxy.

This object was something that I had never heard of before and I wanted to know more about it. I knew I wanted to choose an object which included either growth or production of hot stars, and that somehow related to our galaxy. The Antennae galaxies relate to both these areas as it provides insight into rapid hot star growth, and displays a likely example of the future of our galaxy. Additionally, the Antennae galaxies are the nearest interacting galaxies to our own. The viewing of these interlocked galaxies will provide beneficial research towards how galaxies evolve and their lifespans especially those that are interconnected; these two points of astronomy are areas that would benefit from in-depth research. These intertwined galaxies are the closest to us, so as a result they prove to be the best option to choose.

Vast concentrations of gas are not only found in the centre of the two galaxies but additionally in the hectic region where they are colliding. In here, the gas is billions of times the mass of our Sun. This is an abundant reserve of material for future generations of stars. Observations into galaxies prove this regions in the sub-lighter regions of the universe. It also proves that galaxy collisions can trigger the birth of new stars and the development of hot stars.

The scientific community would gain valuable insight into the merging of two separate galaxies into one elliptical galaxy, and how the collision of two similar galaxies encourages fast star growth. Other results found from looking into these galaxies reveal that the Antennae galaxies contain a high number of heavier elements in them too, especially magnesium, neon and sodium. This could mean that the Antennae galaxies are in a state of habitable planets. If these galaxies were given enough time to be fully studied and investigated, life-sources could possibly be found on surfaces of inhaling planets in these galaxies.

Already, two supernovae have been discovered inside the galaxies, SN 2004GT and SN2007as. The bright, point-like sources seen in images of the galaxies are produced by material falling onto black holes and neutron stars that are remnants of massive stars. Some of these black holes may have masses that are almost one and a half times that of the Sun. If ESO were to provide sufficient telescope time, the further investigations into these intertwined galaxies would be greatly valuable to our scientific understanding of how the universe functions and evolves. Other vital facts could be found out about possible life sources and rapid star formation, if ESO were to provide the time to view these galaxies.

Observations
On the VLT I would use SINFONI (Spectrograph for integral Field Observations in the Near Infrared), which is a near infrared integral field spectrometer fed by an adaptive optics module. This would provide one of the right wavelengths to view the Antennae galaxies. Even though composite and visible wavelengths both display different views of the galaxies, infrared is the wavelength that I would like to view them at.

The apparent magnitude of these two galaxies is 11.2 for NGC 4038 and 11.1 for NGC 4039. Their distance from our galaxy is unknown, which is closer than we initially thought. These two intertwined galaxies are found in the constellation of Corvus. Their co-ordinates are: 12, 01, 53 + 18, 52, 10. These galaxies are visible from the VLT in Chile, which is in the Southern Hemisphere, in later September. The distance they are from our Milky Way is 4.5 million lightyears. They are located 0.25 north of 31 Cetartes and 3.25 southwest of Gamma Corvi. To view these galaxies at their prime with the VLT, I would view them in late September (20 - 09 - 2017) at 10:00am - 2:00am at an altitude of 64°. This is because the moon is not interfering with the visibility of the galaxies, and they are at the correct placement in the sky to see the best results with the VLT.

References:
[9] https://www.onemilecentre.com/antennae-galaxies - object information site (includes pictures)

PhD Tutor’s note
L. has been an excellent student on my Uni Pathways course. She wrote a very persuasive proposal to observe the Antennae Galaxies and used all the resources available to explain the technicalities of observing such objects which are not easily observed and which telescope would be most appropriate. Her dedication and enthusiasm throughout her tutorials allowed her to excel in the field of research and to complete her assignment to a standard beyond that expected of a level
There are four main types of leukaemia, acute lymphoid (ALL), acute myeloid (AML), chronic lymphoid (CLL), and chronic myeloid (CML). They are classed by how quickly the disease progresses (acute or chronic), and which type of cells are affected (myeloid or lymphoid). Less common types of leukaemia include hairy cell leukaemia and acute promyelocytic leukaemia.

Each patient’s prognosis can be very different, it depends on their age, the type of leukaemia they suffer from, how far the disease has progressed, symptoms present, and whether or not the disease has spread to the central nervous system, lymph nodes, or elsewhere in the body.

After observation of the symptoms, leukaemia can be diagnosed through a physical exam, to discern if the spleen and liver or lymph nodes are swollen, blood counts, and a bone marrow examination. The blood test is performed to identify abnormal cells and is also likely to be used to estimate how many white blood cells, commonly referred to as WBC count. To make entirely sure of the diagnosis, often a biopsy is used to extract bone marrow from a large bone, such as the hipbone. In a biopsy a small piece of bone is removed along with the marrow. Once the diagnosis is certain, blood chemistry tests or a spinal tap can check if the disease has damaged any other parts of the body, particularly the liver and kidneys, or if it has spread to the CNS.

Treatment depends highly on the type of leukaemia that affects the patient, as well as their age and general health. The aim for acute leukaemia treatment is to induce remission, which, with aggressive chemotherapy, is achievable and likely in most patients. However, because the leukaemia cells grow and mature slowly in chronic leukaemia, they also respond to treatment slowly and often only slightly, so it is difficult to achieve total remission. Treatment for chronic leukaemia is usually less aggressive, and focuses on controlling the disease, managing the symptoms, and prolonging the patient’s life, rather than killing all the cancer cells.

Treatments for acute leukaemia focus on the control of the disease in the bone marrow and systemically, and are generally divided into several phases: induction chemotherapy, consolidation or intensification therapy, and then, for ALL, only maintenance treatments. The very intense first stage usually lasts a month and is used to take the patient into remission, using drugs such as prednisone, vincristine, L-asparaginase, cyclophosphamide, and an anthracycline drug. Consolidation or intensification therapy uses antimetabolites, all-trans retinoic acid, and arsenic trioxide to kill any remaining leukaemia cells, it lasts a few months, and its intensity can vary depending on the likelihood of relapse. Finally, for patients suffering from ALL, lower dose maintenance treatment is used to prevent further disease. This treatment may continue for up to three years, but almost normal activity can be resumed.

Patients can also have radiotherapy or injections into the cerebrospinal fluid to rid the CNS of leukaemia. This can also be a prophylaxis measure.

Treatment for chronic leukaemia, particularly for CLL, often begins with watching wait, and monitoring with blood tests, because the disease is at an early stage and is not yet widespread. Therefore, chemotherapy may only effect the patient by worsening their quality of life. In patients with CML, matinib tablets are usually prescribed starting the disease in remission. The aim is to achieve remission after eighteen months of treatment, however, the disease is likely to relapse. As the leukaemia progresses, chemotherapeutic drugs such as fludarabine, cyclophosphamide, and rituximab are used to control it and lessen the symptoms.

All leukaemia patients can have radiotherapy to shrink swollen lymph nodes, surgical removal of the spleen if enlarged, and other therapies to support the immune system such as blood transfusions and immunoglobulin replacement therapies.

Chemotherapy, the administration of drugs that kill rapidly dividing cells, is the main treatment for all leukaemias, and can be taken orally, or by intravenous line. Chemotherapy is generally given in cycles, giving patients time to recover from the side effects in between. Side effects depend on the drugs and dosage that are administered, but most patients suffer from hair loss, nausea, vomiting, mouth sores, loss of appetite, tiredness, easy bruising and bleeding, an increased chance of getting infections and infertility in adults. Radiotherapy uses high energy radiation to damage localised cancer cells in the brain, spleen, and lymph nodes. Side effects depend on the part of the body that is irradiated, nausea, vomiting, diaphoresis, headaches, tiredness, and dry, red, tender skin where the radiation passed through it, are all common. Biological therapy is a treatment that uses living organisms, substances that come from them, or synthetic versions that act on processes in cells. They can stop cancer cells from proliferating, kill them, or encourage the patient’s own immune system to destroy cancer cells. Targeted therapy can be administered through a pill, and can cause side effects such as swelling, bloating, weight gain, nausea, vomiting, diarrhoea, rash, and muscle cramps.

All leukaemia treatments have side effects; in the case of chemotherapy to the immune system, this is because they kill healthy cells such as skin and intestinal lining cells. The side effects can create a general feeling of fatigue and being unwell, which can make everyday life very difficult. Also, patients used in adults can be lasting, so patients may have problems conceiving after treatment has stopped. Because leukaemia itself and treatments such as chemotherapy are so damaging to the immune system, patients are generally made immunodeficient and find them difficult to fight off. This can lead to more serious diseases such as pneumonia, and in some cases, death. Also, there is only a chance that patients who suffer from CML can be cured. Treatment is toxic and irreversible, and is not guaranteed to work. Whilst current therapies have their merits, there are certainly improvements to be made in the treatment of leukaemia, particularly regarding their side effects. It is possible that stem cells could one day be a cure.

Stem cells are ‘undifferentiated biological cells’ that ‘give rise to differentiated cells’ and can divide to produce more stem cells indefinitely. There are two kinds of stem cells: embryonic and somatic. Embryonic stem cells are very limited in their development, in 3–5-day old blastocysts, they are multipotent, meaning they can give rise to all cells from the three primary germ layers. Somatic stem cells are limited in their development, they can give rise to all cells of the eye, intestines, bone marrow, testicles, ovaries, muscles, and breasts. Their function is to replace damaged cells. They are multipotent, meaning they can differentiate, but are more limited than embryonic stem cells, as they can only become cells found in the area where they begin.

New research suggests that stem cells can be used to treat many diseases, including leukaemia, and used in medical testing rather than animals. However, many people do not agree with the usage of embryonic stem cells, because the embryo must be killed for the cells to be used in research or treatment. The alternative is using somatic stem cells, but these are only multipotent, so more limited in their differentiation, and are therefore not as useful. Although, living donors can donate these cells, and in some cases, patients can use their own somatic stem cells in transplants.

Research is also looking into changing somatic, differentiated cells back into a stem cell-like state. This process was first discovered in 2006 by Shinya Yamanaka, he won the Nobel Prize for Medicine in 2012 for his discovery. Every cell in a human being contains the same DNA, but the transcription factors in each cell’s nucleus control which parts are active and make proteins, and which are dormant. These proteins and the order they are made is unique to every type of specialised cell, so, without transcription factors, cells could not become specialised. Yamanaka discovered four genes that code for pluripotency: Sox2, Oct4, Klf4, and cMyc. He introduced them into mouse fibroblast cells. The differentiated cells subsequently became pluripotent, and very much like an embryonic stem cell. The new cells are named induced pluripotent stem cells.

Currently, both autologous and allogeneic stem cell transplants are used to treat leukaemia. Autologous treatments use patients’ own cells and allogeneic treatments require a
donor with the same, or very similar, HLA type as the recipient; a sibling is often the closest match.24 The transplants are used to repopulate the body's healthy bone marrow and blood cells that have been damaged by the disease and chemotherapy, and induce remission if other treatments have not worked.25 In patients with chronic leukaemia, stem cell transplants can induce a permanent remission. Before the transplant, the patient must undergo conditioning therapy, intense chemotherapy to kill leukaemia cells, bone marrow cells and to suppress their immune system. Then, the donor or patient, depending on the type of transplant, will be given granulocyte colony-stimulating factors so the haematopoietic stem cells can be collected from the blood.26 In autologous transplants, the stem cells must be processed, to ensure they are healthy.27 The stem cells are then infused to the patient, and travel to the bone marrow to make new blood cells. In allogeneic transplants, some immune cells are also transplanted, in the hope they will attack and destroy the leukaemia cells. Human trials using L-2 have shown terrible side effects in 30% of patients, but for some, it could be a viable treatment option. It has also been demonstrated using priming a patient with IL-2 before a bone marrow transplant creates an antitumour effect that can kill residual disease in mice. Also, using granulocyte–macrophage colony-stimulating factor along with a bone marrow transplant can induce cytotoxicity against tumour cells.26

Lastly, iPSCs are currently being used in laboratories to study how leukaemia arises, and to test new therapies for it. iPSCs are used because many of them can be made, and converted into leukaemia cells, quickly and easily.22 iPSCs have been used to create a gene mutation, and then patient derived samples can be made, and used to study the disease.22 One day, the methods used in the lab to make new blood cells from iPSCs could be used in the clinic as an autologous, GVHD risk free therapy for leukaemia.26 Although, it has been proven that iPSCs differ from embryonic stem cells in a number of significant ways, patients with cancer and their structure and properties should take place before they can be used in the clinic.22

How Might Ocean Acidification Affect Marine Organisms by the Year 2300?

Introduction

Ocean acidification is the drop of pH in the ocean over a period of time, turning it more acidic. Over millions of years, the pH of the ocean was stable at 8.2, however due to the increase of carbon dioxide in the atmosphere, the current pH value is at 8.1 – a small change in pH can be a great change in acidity,3 as there is a big difference in the amount of hydrogen ions in a substance. Although this may not seem a huge difference, in the next 100 years, the pH is predicted to drop to approximately 7.7. This means the pH of the ocean will be much lower in the year 2300. Ocean acidification and an increase of CO₂ is an enormous threat to the world and a huge issue that we need to act upon, as it affects organisms in the ocean, but also the environment around us, including ourselves. At the moment, there are only a few species of marine animals that get affected by ocean acidification, but in the future there could be many, many more. Also, it is a possibility that some types of species have the potential to adapt to changes that ocean acidification is making to the ocean.2 In my final assignment I have chosen to identify the consequences of ocean acidification on many coral reefs, as I strongly believe they are affected and damaged the most, however I will also evaluate the effects on other organisms living in the ocean, such as shells and marine fish.

Carbon Dioxide Emissions

Carbon dioxide occupies about 0.04% of the world’s atmosphere, however this is increasing over time, with CO₂ levels increasing by approximately 0.1% per year for the last 100 million years. However, since the industrial revolution, the burning of fossil fuels has caused the amount of CO₂ in the atmosphere to increase4. There are many things in the world that lead to an increase of greenhouse gases, one of them being deforestation. When trees photosynthesise, it reduces carbon dioxide as they use it up in the process. However, the reverse occurs when there is carbon dioxide + water (and light energy) makes oxygen and glucose. By cutting down trees there are less of them photosynthesising, which releases carbon dioxide. The rising human population is adding to atmospheric carbon dioxide in many ways.5 For example, more people are driving cars as technology is advancing, this is also releasing CO₂. Also, smoking increases carbon dioxide levels in the atmosphere, which is bad for the environment. Another major problem is the burning of fossil fuels by factories, which is causing pollution in the atmosphere, being a threat to humans and animals.

Bibliography


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the future and do our best to try and successfully stop the carbon dioxide concentrations from increasing, such as burning less fossil fuels, as this could cause serious issues for the world and marine animals in the near future.

Calification
The carbonate chemistry system is a form of buffer system, which helps to maintain a stable pH in the ocean [8]. It works by releasing ions to neutralise any changes caused by new chemicals. This is the carbonate chemistry system for seawater:

Carbonate is an important chemical for marine organisms that combines with calcium for animals to use to make, grow and strengthen their shells and exoskeletons. An exoskeleton is a hard structure that forms on the outside and protects the inside of an organism from the predators within its ecosystem. Marine acidification causes the reduction of carbonate ions in the ocean, which means some animals do not have enough calcium carbonate to grow. If during the development of an animal their amount of calcium carbonate has been reduced – it is possible that it will not develop properly, and they could be more at risk from predators. There has been a decreased rate of skeletal growth and reproduction in marine animals due to the decrease of pH [9]. For example, decreasing carbonate ion concentrations will lead to weaker, more brittle skeletons for various marine animals. A study of brain corals by Cohen [10] in Bermuda showed that calcification rates have decreased by 25% over the past 50 years and ocean acidification is most likely the main contributing factor. In the future, it is predicted that shells and different types of coral reefs will most likely erode faster than they can re-calcify. Ocean acidification is a substantial threat to all organisms living in the water which is changing the oceans around the world.

Direct effects
A direct effect is a clear, primary response to something – in this case, changes in the ocean due to ocean acidification and the increase of carbon dioxide [12]. Ocean acidification can be considered as an ‘environmental stressor’, meaning a change in condition of the environment that causes stress on an organism [13]. An example of a direct effect is when calcifying organisms would be having a deformed shell or weak exoskeleton when growing, with the organism being smaller than the average size of the species. Another example of a direct effect is organisms like fish being eaten by predators, due to the acidity of the ocean damaging their otoliths (a calcium carbonate structure in fish’s ears that can pick up vibrations from the environment). This means the fish cannot sense the predators around them, because their otoliths are weaker and more damaged than they were before.

The graph above shows the results of an experiment we carried out recently. It shows us the weight change of the shells in percent, after keeping them in various pH solutions. We tested eight shells in total, four white and four blue to see whether there was a difference in the shells. We labeled 8 Eppendorf tubes with the corresponding shells and a different pH. For a fair experiment, we controlled the amount of pH solution, making sure all of the tubes had the same amount. Before the shells went in the tubes, we weighed them correctly. After one week, the shells were left in the tubes for a week. Finally, when they were taken out, they were weighed once again and we calculated the percentage weight change. The results showed that white shells had bigger weight changes on average than blue shells. This tells us that some species (or in this case shells), are more at risk than others. The shells eroded more in the acidic solutions, showing that shells in the ocean damage and erode because of ocean acidification. In the future, this could happen much faster and shells may erode more overall, if the pH of the ocean continues to fall.

Indirect effects
An indirect effect is the secondary consequence of a change in something. There are many direct effects of ocean acidification on marine animals, but alternatively, there are also indirect consequences. Fish breathing faster is an example of an indirect effect, as there could be other factors that have an impact on this, as well as the changes in behavior of the organisms. In the ocean, carbon dioxide is an important chemical for marine organisms and is released into the water. The inputs of carbon dioxide on the environment are endless. One of the main issues is technology. Before, in the industrial period, carbon dioxide was heavily increased with the burning of fossil fuels. Nowadays, most countries are in an advanced period of modern technology, where new ‘luxuries’ that companies produce have a carbon dioxide limit as our society is becoming more reliant on modern technology [16]. This is called ‘Contemporary Industrialization’. However, it would be unrealistic to stop or limit the advancement of technology altogether due to carbon dioxide emissions. Therefore, instead of constantly producing new and advanced products, it would be more beneficial to improve and develop the current technology we have, considering their impact on the environment [17]. Until this technology becomes more environmentally-friendly and more efficient to us, the uptake of carbon dioxide on the atmosphere will continue to increase. Another problem is population size. As the population in the world is constantly increasing, more people are releasing carbon dioxide by doing everyday activities, such as cooking, travelling etc. Most people do not realize the consequences and effects that carbon dioxide is having on the human environment. There are many different problems that we face due to climate change, such as driving a car to and from work. If we all consider our carbon footprint and think of ways to reduce the amount of carbon dioxide released – for example using less electricity at home, or using public transport to travel to places, we can potentially stop the chances of CO2 levels increasing any further.

Conclusion
In conclusion, I believe ocean acidification as we know it today is a problem that affects the marine organisms, and the uptake of carbon dioxide has a serious impact on our environment that we need to change. I think it is important that we must take action and do all that we can to try and decrease the carbon dioxide emissions, as evidence shows if we do nothing about it, the levels of CO2 will continue to rise and harm our environment even more. Numbers of calcifying marine organisms affected by ocean acidification will start to decrease in the future as they are becoming under threat. We cannot let this happen. Furthermore, if the carbon dioxide uptake in the environment does not decrease, we will have nothing to worry about, as the pH levels of the ocean will not continue to decrease and harm the animals. A study by Bob Yirka [18] in 2015 shows that ocean acidification surprisingly is not harmful to coral reefs, which was surprising to me. The report states that researchers noticed in a case study by Phillip L. Munday [14] in 2015 shows that coral reefs after all. The report states that researchers noticed in a case study by Phillip L. Munday [14] in 2015 shows that the coral reef is more prone to disease and extremely vulnerable. Corals may survive a bleaching event, but they are more under stress and very likely to be subject to mortality.

Now and the Future
The inputs of carbon dioxide on the environment are endless. One of the main issues is technology. Before, in the industrial period, carbon dioxide was heavily increased with the burning of fossil fuels. Nowadays, most countries are in an advanced period of modern technology, where new ‘luxuries’ that companies produce have a carbon dioxide limit as our society is becoming more reliant on modern technology [16]. This is called ‘Contemporary Industrialization’. However, it would be unrealistic to stop or limit the advancement of technology altogether due to carbon dioxide emissions. Therefore, instead of constantly producing new and advanced products, it would be more beneficial to improve and develop the current technology we have, considering their impact on the environment [17]. Until this technology becomes more environmentally-friendly and more efficient to us, the uptake of carbon dioxide on the atmosphere will continue to increase. Another problem is population size. As the population in the world is constantly increasing, more people are releasing carbon dioxide by doing everyday activities, such as cooking, travelling etc. Most people do not realize the consequences and effects that carbon dioxide is having on the human environment. There are many different problems that we face due to climate change, such as driving a car to and from work. If we all consider our carbon footprint and think of ways to reduce the amount of carbon dioxide released – for example using less electricity at home, or using public transport to travel to places, we can potentially stop the chances of CO2 levels increasing any further.

Associating the MMR Vaccine with Gastrointestinal Disease and Developmental Regression 

Published in the Lancet

Year 10, Key Stage 4

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Supervised by A. Leite, London School of Hygiene and Tropical Medicine

In 1998, Andrew Wakefield published a case series in the Lancet suggesting an association between the measles, mumps, and rubella (MMR) vaccine and gastrointestinal disease and developmental regression in children. Despite the insufficient data, existence of bias and uncontrolled design, the paper lead to widespread publicity in the UK. MMR vaccination rates began to fluctuate due to the concern parents across the world regarding the newfound risk of autism after vaccinating their children, thereby exposing their children to the risk of disease and other complications. The Lancet retracted the paper in February 2010, tying Wakefield’s fraudulent actions to various epidemics and deaths.

A case series is a descriptive type of medical research study of multiple occurrences of unusual cases, that examines patients’ medical records for exposure and outcome in order to generate or test a causal hypothesis. A case series was used as the basis of this study as all twelve children recruited for the investigation had a history of the outcome of interest, in this case a history of gastrointestinal disease and developmental regression. A case series falls amongst the lowest, due to the lack of control subjects, making it prone to bias. This is because it is not possible to compare what is happening with others as the group is not representative of the population. This means that the cases that have been recruited for the study do not truly establish whether the MMR vaccine is associated with autism.

Not only that, but a case series is susceptible to confounding bias where the association between the exposure and outcome becomes distorted by the presence of another variable that is associated with the exposure and also causes the outcome of the disease. It becomes difficult to identify whether or not there is a confounder that is contributing to the presumed association and adjust for it. The issue with this is that the confounding factors that are examined in the investigation drawn from them are unrepresentative of what is actually happening in the sample, and are therefore biased. This means that the results may not be able to establish whether or not the ‘exposure’ is causal. However, matching controls to cases will mitigate the effects of confounders. This is probably why the logic that the MMR vaccine made children autistic was based rather on a spurious correlation link because the two is almost predefined both events occur in early childhood. In this situation, positive confounding bias occurred as the associated association was biased away from the null hypothesis, that the association was spurious and response variable was implicated. Confounding bias is especially significant in a study because it can cause a reported association (or lack thereof) to be misleading.

Additionally, a case series is subject to selection bias because the researcher self-selects the cases. Selection bias is a systematic error that occurs when selecting participants due to the non-random sample of the population, causing a variance between the chances of selection between members, and thus the observed association is biased away from the null. This is also due to the fact that only severely affected children are caused and were guilty of deliberate fraud. Wakefield was being paid to conduct the study by solicitors representing parents who believed their children had been harmed by MMR. Nearly all the children have gastrointestinal disease and developmental regression against MMR. Wakefield even acted dishonestly in failing to disclose how patients were recruited for the study, he held guided gut biopsies undiagnosed for a number of months which their sampling was consecutive when, in fact, it was selective. This meant that those in the population that suffered from autism and gastrointestinal disease but were not exposed to the vaccine were ignored so that the results of the study would show a link between the variables and make it seem as if the population too had similar results. This is not aided by the fact that Wakefield’s choice of control biopsies was extremely difficult. So, not only is the data in the study unrepresentative of the target population about which conclusions are to be drawn, but the sample was also affected by the outcome. However, this sampling method can prove useful for rare diseases that there may not be a sufficient number of cases. The possibility of selection bias should always be considered when defining a study sample, and a more representative selection of random sampling can be used to provide reliable and valid results, as they lack systematic error.

Furthermore, when responses are incomplete, the scope for bias must be assessed. A case series can be very useful in generating hypotheses about the disease or exposure. However, in this study, Wakefield searched and interpreted information in a way that confirmed his initial hypothesis, and ignored evidence that could disconfirm his hypothesis, leading to the conclusion that the data was statistically significant. He then had to think of it as a form of selection bias in collecting evidence. To resolve this issue, the case series should have been used to generate the hypothesis, so that Wakefield would not make preconceptions about what he expected the data to be like, and would instead use an approach to consider situations with different outcomes.

If a case series is retrospective, it will depend on the availability and accuracy of the data results. This was the case in the study as they took histories, including details of immunisations and exposure to infectious diseases, and assessed the children’s health. In the experiment they conducted, including colonoscopies, colon biopsies and lumbar punctures on his research subjects contrary to the children’s clinical interests, which were applicable to the study, as it was evaluating the children’s symptoms or medical history. A simple technique that can be adopted is to increase the frequency and quality of data checks so that every item of data will experience data quality degradation.

Another issue with the study is the sample size. A study with an insufficient sample size may be associated with a reduced power and a reduced chance of detecting a true effect. The consequences of this include overestimates of effect size and low reproducibility of results. Improving reproducibility allows the findings of the investigation to be generalised for the population as interpretations and conclusions drawn from the data have a low variability to those of the population. Variability determines how far the true results of the experiment are from the results of the sample compared to the population using the standard deviation. A large standard deviation indicates a larger based sample size, which is due to smaller sample sizes getting increasingly further away from the entire population, which may lead to bias.

Perhaps the most significant bias in this case series was information bias which results from systematic differences in the way data is obtained on the exposure or outcome. One example of this is child 11; records provided information that normal months after, and some did not have autism at all. The worst scenario here is that there was a critical mismatch between the records and the contemporaneous records. In fact, it was discovered that some children showed symptoms before they received the MMR vaccination, some were considered normal months after, and some did not have autism at all. An example of this is child 11, records provided information that symptoms had appeared months before than as had been reported in the Lancet a not one month prior to the boy receiving the MMR vaccination. Furthermore, evidence from child 11, that cannot be explained by the diagnosis or course of inflammatory bowel disease and had reported in most of the cases the gut was not affected, yet the Lancet paper reported otherwise. Additionally, in a large number of the 12 cases, parents had undergone testing and were referred from their hospital and GP records. In spite of the fact that the paper guaranteed that issues occurred within days of the vaccination, medical records showed that this was valid in only one case. Much of the time, medical concerns had been brought about before the children were immunised. Observer bias strongly affects the validity of a study as the conclusions that have been made are based on biased observations, which are due to the presence of observer bias. The presence of observer bias, it should ensure that observers are well trained, there are clear rules and procedures in place, a time frame for the duration of the experiment, as well as conducting screening observations for potential biases.

The final disadvantage that I will discuss is that case series studies are not the most reliable the results of the experiment are. Any study that takes a sample from the whole population, generalises the results to the whole population. This inevitably leads to a possible recall error because the whole population can never be accurately described by a part of it. It is this uncertainty we try to quantify by the use of confidence intervals, these provide a range about the observed effect size of the true mean in the population on either side of the odds ratio and focus on a range of likely values and not just the significant ones. Most confidence intervals have a confidence level of 95 percent. This means that if the investigation were to be repeated, there would be an expected 5 percent chance that the true value is not within the confidence interval.

In conclusion, the Wakefield et al. 1998 paper was dominated by weak evidence and inappropriate use of and results which were instantly controversial and was criticised for its invalidity and further studies were conducted right away. Although all the children that took part were enrolled in the MMR vaccine and gastrointestinal disease and developmental regression, just by critically analysing the paper, we can understand how imperative the study design is as it affects everything thereafter in the experiment.

Bibliography:


PhD Tutor’s note

M was a very keen student and it was a joy to work teaching her some key concepts in Vaccine Safety studies. I was impressed with both her passion and her readiness to apply the main concepts to criticise a paper and she was able to identify its main flaws and propose alternative ways of conducting a study that would allow for correct conclusions to be drawn. She is definitely performing to an excellent standard at A-Level.
An Investigation into the Relationship Between Hand Preference and Pseudo Neglect Using a Line Bisection Task

A. Orgill, Year 10, Friesland School, Nottingham
Supervised by L. O’Regan, University of Nottingham

Handedness and the experiment:
Handedness is the preference of one hand over the other for use in tasks where advanced motor skills are required. Individuals who favour their right hands typically have a dominant left hemisphere of the brain; those who have preference for the left hand have a dominant right hemisphere. However, those who are left-handed usually show less extreme dominance, as they adapt to do certain tasks with the right hand, due to growing up in a mostly right-handed world. The assessments of tests to different sections of our brain show that our brains are asymmetrical.

Left-handed people make up about 10% of the world’s population, and thus were rare occurrences in competition over food and resources in prehistoric times. This gave them an edge in terms of competition, as the right-handed opponent they would face would have very little experience of their alternate handedness, giving them an element of surprise. This advantage was not seen however in normal life, as any tools made by a tribe were made for the right-handed end user, and use of sword and shield was an issue, as left-handers would have preferred a weapon in their weaker hand, but at the penalty of not protecting their heart.

Historically and more recently, doctors have noticed that damage to the brain potentially causes visual neglect (MacLeod & Turnbull, 1998), which is the inability to recognise one side of the visual field. For example, a right-handed person may fail to notice a threat on their left side due to the damage. However, not all left-handers have the same degree of visual neglect, as the degree of dominance varies. In general, the test was successful in determining the laterality quotient of the participants, as those who were right handed scored positive, and left handed negative, however inaccuracy was possible due to participants biasing towards what they believe is expected of them when asked questions. An alternative method of determining laterality quotient could have been employed to observe participants, in blind trials, to see what they would do with no knowledge of the question at hand. A test such as the Bell Cancellation test (Gauthier, Dehaut & Joanne, 1989) could have been suitable as it allows the observers to observe the participant’s visuospatial attention. This would have been done by asking the participant to cross out any appearance of a bell among the pictures. By tracking which area of the paper the has crossed, and in which order they are cancelled, the neglect of one side of the page could be determined. Some argue that writing direction could affect the order of cancellation, but this was countered as even those who wrote in languages that go right to left across the page, still showed a negligence of the right overall. A test such as this may reduce bias in answering the question, however would be more time consuming, and would require more materials.

For the line bisection task, the furthest right average value was 4.75mm, and -1.5mm the furthest left. This average was calculated from both ends of each hand.

These results calculated as an average of -3mm for the left hand and -2.75mm for the right hand as the distance from the line in the bisection for the entire group.

What was found?
The test was to find out whether the laterality quotient of an individual relates to their amount of pseudo neglect as measured using the line bisection task. The test revealed a very slight negative correlation, which was to be expected, however the general amount of variation in results gave almost no visible pattern whatsoever. A large number of the participants scored values which were very much out of line with what was expected. For instance, participants with line bisection scores 5cm left and 1cm right in the bisection, when expected to score in the negative. In addition to this, the t-test result gave the value of 0.78, which is substantially larger than the requirement of less than 0.05, to prove that the results were 95% accurate. This means the difference of the two means of the variables was not significant. This large number of outliers could be due to the participants performing the test. Some participants may have been more or less careful in the marking of the line, those who took more time being a more likely to mark a very accurate midpoint, as opposed to those who took less time being less accurate. If someone with a high laterality quotient took more time, it could have created an expected low amount of deviation, thus confounding the results.

Left-handed and right-handed scissors.

In general, the test was successful in determining the laterality quotient of the participants, as those who were right handed scored positive, and left handed negative, however inaccuracy was possible due to participants biasing towards what they believe is expected of them when asked questions. An alternative method of determining laterality quotient could have been employed to observe participants, in blind trials, to see what they would do with no knowledge of the question at hand. A test such as the Bell Cancellation test (Gauthier, Dehaut & Joanne, 1989) could have been suitable as it allows the observers to observe the participant’s visuospatial attention. This would have been done by asking the participant to cross out any appearance of a bell among the pictures. By tracking which area of the paper the has crossed, and in which order they are cancelled, the neglect of one side of the page could be determined. Some argue that writing direction could affect the order of cancellation, but this was countered as even those who wrote in languages that go right to left across the page, still showed a negligence of the right overall. A test such as this may reduce bias in answering the question, however would be more time consuming, and would require more materials.

...
In the line bisection task, it was easy to perform repeat tests, as it simply required the reproduction of the same action. The ease of repetition gives the test greater reliability and validity. His reliability was reliable enough to be taken, and any anomalies removed. Confounding variables may have played a part in the unusual results of the test. Orientation of the page in front of the participant could have affected their accuracy, tiredness or dehydration may have hindered cognitive function and in turn caused unexpected or exaggerated results (Benwell, Harvey & Thut, 2014). Repeats were taken to reduce this factor, but different approaches to the task could have also been a cause for different results, as some participants may have taken more time and care in accurately bisecting the line, whilst others may have been quick and casual.

If the experiment was to be redone, it may be beneficial to give each participant a time limit upon bisecting the line, to reduce the variation of technique by each participant, creating more reliable results. Rather than just using a questionnaire to determine laterality quotient, an observation could be taken to reduce bias.

Ultimately, despite the use of repeats in the test, the findings were inconclusive. The t-test values show the test was not significant and the correlation was so slight it was almost negligible. To determine whether these conclusions were valid, a further experiment was not considered relevant because laterality quotient and pseudo neglect are unrelated, would I believe, take another test to deduce.

Identify, Describe, and Explain the Impact of Three Effective Communication Skills Behaviours in the Transcript That You Receive.

Year 10, Key Stage 4

C. Jones, Stalham High School, Norfolk
Supervised by M. Fromage, University of East Anglia

Communication skills are arguably the most fundamental element of human interaction, today they are increasingly necessary as the world transitions into a technological environment. Communication is no longer just information broadcasted vocally and non-verbally (through gestures), progressively it is becoming a transmission of information across written platforms (such as emails, texts and websites). Good communication skills ensure success at work and within social relationships. Without good communication, misunderstandings can occur which can hinder objectives of varying degrees of importance. Research conducted upon the US Joint Commission on Health in 2002 concluded that up to 55% of medication-related errors in US hospitals and more than 65% of deaths were a consequence of ineffective communication (Wright, 2012).

It is of paramount importance, therefore, that we understand the messages we receive from others. However, studies suggest that it is likely that humans hear only half of what is said to them, understand only half of that, believe half of that and remember half of that (Walker, 2002). To optimise human understanding, it is necessary that we improve our communication skills.

Communication is no longer just information broadcasted vocally and non-verbally (through gestures), progressively it is becoming a transmission of information across written platforms (such as emails, texts and websites). Good communication skills ensure success at work and within social relationships. Without good communication, misunderstandings can occur which can hinder objectives of varying degrees of importance. Research conducted upon the US Joint Commission on Health in 2002 concluded that up to 55% of medication-related errors in US hospitals and more than 65% of deaths were a consequence of ineffective communication (Wright, 2012).

The value and effectiveness of communication skills will be assessed in a model of interpersonal communication – A Family Trip to the Zoo. The area of focus will be limited to three elements of communication skills, including paraphrasing, empathy and open questions.

Paraphrasing is the skill of communicating to a speaker that their messages have been understood. An important element of empathy is that the speaker’s emotions reflected in their words have been understood. It invites the speaker to connect the listener if necessary, subsequently reducing the possibility of later misunderstandings. Additionally, paraphrasing the words of the speaker acts as a prompt for them to persue, which can provoke the transmission of more details to further the comprehension of the listener – important, in fact, for a doctor-patient scenario.

A ‘Family Trip to the Zoo’ is paraphrased to symbolise a shared environment, where the character of the characters, Amy and Andy. Within the transcript, it can be inferred that Amy and Andy have not communicated effectively enough for them to understand each other’s and the emotions involved. Andy paraphrases this (‘so my games are too loud, I take too much stuff and eat too many sweets that makes me feel more travel sick’) to ensure that he has secured an understanding of the issue. His competence in understanding is indicated by Amy’s response of ‘yes, exactly.’

Andy’s use of paraphrasing, beginning with ‘so’, allows Amy to refine her answer if it was necessary. This can ensure Amy feels involved, it shows her that her brother is interested in resolving her complaint and gives her the time and opportunity to correct her mistakes. In addition, as paraphrasing does not encourage an evaluation of a comment, Andy did not provoke a negative reaction from Amy, which could have been the case and a further aspiration. In A Family Trip to the Zoo there are examples of paraphrasing being used elsewhere – Mum seeks to understand Amy by inferring her feelings from her dialogue, ‘am I right in saying you get frustrated?’ and Andy, with empathy, is less directive; ‘ok, well I’ll only say if he tries’, which could indicate that she has not listened effectively to Plum. In a similar scenario, another attempt would be made to maximise the speaker’s understanding.

As paraphrasing seeks to demonstrate to the speaker that they are being listened to (O’Hara, Dixon 2008), it can also promote a rapport between the speaker and listener. This is identified after the incident of paraphrasing in the transcript as Amy’s reaction to Andy and Amy are considered as contrast to their previous dialogue – ‘I can try and help’, ‘I’ll try to stop’, ‘would that help?’ in comparison to ‘you are right, you are very nice, you need to do’. This attempt to acknowledge the discontentment of Amy by paraphrasing has meant that their conversation is less confrontational. The rapport built throughout the conversation subsequently allowed Amy and Andy to reconcile their differences and previously, they would have acted uncooperatively to retain their habits, they have learnt to understand one another. Additionally, paraphrasing in the transcript is significant; it acts as the change from unstructured arguing to considered setting.

Empathy is a core component of a communication skill set. It is defined as having the ability to respond to both verbal and non-verbal cues of a speaker in a caring, humane and responsive manner (Della Mtra, 2012). Paraphrasing opens the line of communication and evaluation of a comment, the listener’s focus on body language, gestures and careful observations of any silence within conversation as well as tone of voice and language used. This pattern of behaviour, which involves adopting the listener’s responsive content to the emotions conveyed by the speaker, is essential for an authentic understanding.

‘A Family Trip to the Zoo’ includes many compassion responses which could be classified as showing empathy between characters. The first instance of empathy involves Mum and Andy. Firstly, Amy discloses her anxieties relating to the upcoming car journey – ‘well, I get really bored, Andy is annoying and then I sometimes get travel sick’. Andy exhibits empathy in her response ‘I understand that this can all be frustrating’, primarily through use of the verb ‘understand’. Immediately, it communicates to Amy that her fears are rational and are recognised. The description of her angst as ‘frustrating’ is also empathetic, Amy’s exasperation has been evaluated by Mum using differing language, indicating that she understands her situation. This example contrasts to Mum’s initial sympathetic response of ‘listen you two, I mean that the journey is so long,’ listen, a command verb denotes that from the outset, Amy and Andy are wrong and unjustified for having an opinion, which therefore must be rectified. The unprompted style of this response takes form in ‘I’m sorry’, with little attempt to consider oneself in such a position. Subsequently, the structure of her words appears condescending – the placement of ‘I’ at the beginning of the speech instantaneously shows disregard for their concerns. Also, this counteracts the minimal compassion found in ‘I’m sorry’.

Empathy is also found in Andy’s answer to ‘do you understand how Amy might be feeling?’. Although Andy does not, he says he can ‘try and help’. This is a genuine empathetic response despite the lack of shared understanding as it indicates that Andy is non-judgmental, sensitive, open, and capable of imagining another person’s experience (Rosenburg, 2010).

Progressively, the issue impacting on positive relationships between Amy and Andy is resolved, most likely due to Amy’s increased confidence in Andy to settle the irritants and therefore solve her angst. Also, Andy has removed his own opinion, on his own words, from his previous dialogue, on Amy’s wellbeing, which has positively impacted on the duration of the dispute. Otherwise, the conversation would have focussed on the nature of each character instead of the triggers for unhappiness and the process of resolution may have been longer.

Open questions are used effectively within ‘A Family Trip to the Zoo’ to engage the subjects in resolving an ongoing dispute. An open question is an appropriate communication technique used to encourage the conversation between characters. The questions concerning a speaker (Lasmine, 2009). Furthermore, they can be used to assist the patient to discuss and clarify what he or she is thinking, concentrate, and feel understood (Liones, 2009). Although there is a variety of questioning styles to suit each motive in a conversation, open questions are generally operated to gain information, express an interest on or manage the conversation and explore the difficulties and ideas of another.

PhD Tutor’s note

When children are shown videos of situations where they see people suffering pain by concordance, neural circuits related to pain are being activated in their brain.
Within the transcript, open questions are deployed intermittently to direct the conversation on a specific course for the conflict played out between the characters Amy and Andy to be settled.

‘What is your main concern about the journey?’ Mum enquires to Amy and Andy, who have both expressed unhappiness about the zoo journey. Andy responds by stating Mum in understanding their judgements, as open questions query attitudes that ‘are on the respondent’s mind at the time of the interview’ (Reid, 2007). Andy and Amy are helped by inserting structured time to logically consider their views. Additionally, with the question being posed indirectly to both characters, it opens a window for discussion between both parties.

However, despite Mum’s attempt to facilitate a constructive discussion around this, Amy is unspecified in her answer regarding Andy’s behaviour (‘Andy is annoying’) and therefore creates an alternative chaotic dispute. If she had explicitly stated in her initial argument the nuisances that Andy creates, there would have been more direct conversation relating to possible resolutions relating to this. It is a lack of attention to detail and inactive listening skills that are evident in the passive behind Andy’s response to Mum’s question. She most likely prejudged the content and reasoning behind the formation of the question due to the description of her ‘pulling a face’, potentially because of her relationship with Mum.

Another example of an open question found within A Family Trip to the Zoo is ‘do you think Andy is annoying?’ and ‘How can you change this?’ Not only does this secure confidence in all communication skills, but it ensures that one can deliver an understanding to all making Andy’s attempt to understand how that must be? to allow for shorter, less uncooperative; she introduces closed questions ‘do you think Andy is annoying?’ and ‘How can you change this?’

The success of this technique played out between the characters’ ineloquence. Therefore, closed questions were addressed in line one. However, the effectiveness of open questions, are all vital to strengthen understanding and the importance of face processing and feature analysis. Feature analysis is where a human only needs an individual feature to recognise a face, holistic processing is where the whole face is needed to recognise a face.

Numerous experiments have been carried out in order to figure out whether holistic processing or feature analysis is more effective when trying to recognise a person. One experiment in 1986 done by Rhea Diamond and Susan Carey was looking into feature analysis and whether faces are special and are the only thing that can be recognised from images or whether other objects could also be recognised from one feature. [1] The conclusion to their experiment was that human faces aren’t the only thing that can be recognised from one feature but also creatures like dogs could be.

A holistic processing experiment carried out in 1987 by Andrew W Young, Deborah Hellawell, Dennis C Hay was done to help understand the holistic processing and feature analysis. [2] Their experiment consisted of participants looking at stimuli to see if they recognised the whole face even if it was only a part of the participant’s face. These psychologists came to the conclusion that feature analysis is important but it may be easy for a face to be recognised if it’s the whole face.

With the evidence given from previous experiments, the topic of face perception is a very important one to be discussed. The experiment that was carried out in this report, to explore facial perception, was done through holistic processing and feature analysis. A holistic processing experiment was done to help researchers figure out whether facial recognition time was quicker during a holistic processing experiment or a feature analysis experiment. The reason behind trying to find which reaction time would be quicker was to present evidence to other researchers so they knew which method of face perception was more effective.

The hypothesis that was given at the start of the experiment stated below was that holistic processing would have a quicker reaction time than feature analysis when they were asked to recognise a face. The number of seconds it took the participant to correctly identify the face would be the unit to measure whether the holistic processing or feature analysis reaction time was quicker.

Method Participants

There were 8 participants that were involved in this psychology experiment: three males and five females. The gender and ages of the participants during the holistic processing condition are as follows. Participant 1 was male and 15 years of age and participant 4 was male and 16 years of age. These two were chosen to participate because of the one year age range between them. Participant 2 was male and 48 years of age and participant 3 was male and 47 years of age. These two were selected to take part in the experiment as they also had a one year age range between them just like participant one and four. In addition to the one year age range, the participants were also chosen for their age. The gender and ages of the participants in the feature analysis condition are also as follows. Participant 1 was female and 15 years of age, participant 2 was female and 44 years of age, participant 3 was female and 14 years of age and lastly participant 3 was male and 66 years of age. They were selected by convenience sampling although volunteer sampling and opportunity sampling was also considered. The participant variable would be everything that affects the person during the test. Fatigue is an example of this variable as it may result in a slower reaction time due to the fact that their brain may not be as focused.

Material

There were many materials that were used to help carry out the experiment, to make it as successful as possible. The PowerPoint was the main material used throughout the experiment as the characters ‘Andrew and Alice’ was introduced to them, they were given a face to look at the two pairs were either adolescents or of an older age. These two were chosen to participate because of the one year age range between them. Participant 3 was male and 48 years of age and participant 3 was female and 47 years of age. These two were selected to take part in the experiment as they also had a one year age range between them just like participant one and four. In addition to the one year age range, the participants were also chosen for their age. The gender and ages of the participants in the feature analysis condition are also as follows. Participant 1 was female and 15 years of age, participant 2 was female and 44 years of age, participant 3 was female and 14 years of age and lastly participant 3 was male and 66 years of age. They were selected by convenience sampling although volunteer sampling and opportunity sampling was also considered. The participant variable would be everything that affects the person during the test. Fatigue is an example of this variable as it may result in a slower reaction time due to the fact that their brain may not be as focused.

Procedure

At the very start of the experiment planning, the type of participants that were chosen to take part were chosen by convenience sampling. This is where the participants are chosen due to the ease of selecting them and how cost effective this method is when choosing people. When the participants were asked, it was their own choice as to whether they wanted to be involved or not to be involved with the experiment. The experiment was agreed by all coordinators of it to take place in a quiet environment with no distractions around them. This was also done to reduce the situational variable which is where the situation can affect the participant, like a room that may be too hot.

When the participants agreed to be a part of the project they had a brief that told them what they had to do during the experiment and whether they had any further questions. One thing that was done was to sign a consent form to say that ‘they have read the participant brief and are happy to take part in the psychology experiment’ and that they understand that their data will remain anonymous and they are ‘free to withdraw at any time’. The participants definitely knew what they were signing up to and that they felt comfortable taking part.

The next step to have taken place was to actually do the experiment. The conditions were done.
Discussion
The average reaction time for recognising faces correctly was quicker in the holistic processing condition than the feature analysis condition. In addition, the number of faces recognised correctly was done, on average, better in the holistic condition than the feature analysis condition. These results support the hypothesis fully as they show the researcher can use the perception of the reaction time process animal behaviour. Psychologists since the days of Galton (1879) have been interested in finding out which methods are the best for perception of the reaction time animal behaviour. Andrew J. Calder, Gillian Rhodes, Mark H. Johnson and James V. Haxby includes a chapter on features, configuration and holistic face processing. This chapter explains how face perception is not identified by the recognition of its isolated, individual features, but by the integration of these features into a perceived whole which demonstrates how other researchers have found similar results to this experiment.

Our study had multiple strengths as during the preparation of the experiment it was decided that it was to be done in a controlled environment, where all participants were tested in the same way. All participants were asked to take part in the experiment in a quiet, undisturbed room where all focus would be on the experiment so we could get the most accurate results. This was done to control the variables to make sure that they were controlled to the best of the researcher’s ability to make them as unlikely as possible to affect the results. Another strength to the experiment was that all researchers used standardised instructions to make sure all participants were given the same instructions before the experiment started. This was done to ensure that no experimenters gave an advantage to any participant by giving them extra information before the experiment was completed.

However there were some weaknesses when carrying out our study. One weakness was that the age difference between the groups of participants was fairly large meaning that not only did groups differ in age but also geographical. This could affect the results of both conditions as the sample of participants that were selected didn’t accurately represent all ages and genders when doing a condition. In the holistic processing the age ranges were different to the feature analysis condition affecting the results slightly as people of different ages may recognise different faces. Another weakness was that the study was done in different rooms at different times of the day. This could have negatively affect the results as the brightness of the room from the different times of the day could have caused a glare on the screen, impairing the participants’ vision when trying to recognise the face.

In future studies the experiment should try and test a wider range of participants in order to see whether holistic processing is easier when trying to identify a face than feature analysis. Different people should be considered when being asked to take part in an experiment should be people in different cultures, different genders and a wide range of different ages. Furthermore, there should be a more or less equal amount of every type of participant to make comparing results more accurate and fair, it’s also imperative that the wide range of people in the sample have to be similar to each other but also different to one another. The sample may also benefit from a survey before taking the experiment on people they know or don’t know to make sure the researcher has the right people to include in the experiment and who not to include.

Our results from the experiment can have real implications that can benefit major corporations and members of the public. An example of these benefits is that identification is mostly done by a full face photo which is the face perception of holistic processing. Organisations do to with identification, such as passports, use holistic processing as it is easy for a security guard to check they have the right person in front of them. This was also found in a experiment (4) where they found that configurations are only properly perceived in upright faces meaning that holistic processing is the best method when trying to recognise a face leaving feature analysis no competition against this evidence. Of equal importance these results can help organisations such as the police to recognise criminals when they have a profile but need to identify them on a low quality surveillance camera. (5) Previous studies have shown that identification, when trying to recognise unfamiliar faces on poor quality surveillance cameras, was easier using holistic processing rather than feature analysis. In conclusion our findings during this study show that on average when recognising a face, human beings find it takes a longer time than feature analysis. These findings could be used to help many organisations when choosing how to identify faces as they can now choose the quickest and most effective way of face recognition. The findings from this experiment should be taken into consideration when planning an experiment that involves holistic processing and feature analysis to further improve on our results to make more accurate and precise evidence.

References:

Table 1: results of number correct and incorrect during the holistic processing experiment.

<table>
<thead>
<tr>
<th>Participant</th>
<th>Number correct</th>
<th>Number incorrect</th>
</tr>
</thead>
<tbody>
<tr>
<td>Participant 1</td>
<td>9</td>
<td>2</td>
</tr>
<tr>
<td>Participant 2</td>
<td>10</td>
<td>1</td>
</tr>
<tr>
<td>Participant 3</td>
<td>17</td>
<td>3</td>
</tr>
<tr>
<td>Participant 4</td>
<td>15</td>
<td>5</td>
</tr>
</tbody>
</table>

Table 2: results of number correct and incorrect during the feature analysis experiment.

<table>
<thead>
<tr>
<th>Participant</th>
<th>Number correct</th>
<th>Number incorrect</th>
</tr>
</thead>
<tbody>
<tr>
<td>Participant 1</td>
<td>9</td>
<td>2</td>
</tr>
<tr>
<td>Participant 2</td>
<td>12</td>
<td>0</td>
</tr>
<tr>
<td>Participant 3</td>
<td>17</td>
<td>2</td>
</tr>
<tr>
<td>Participant 4</td>
<td>16</td>
<td>3</td>
</tr>
</tbody>
</table>

The average reaction time when correctly recognising the face under the holistic processing condition is shown in figure 1 here.

![Figure 1: The average reaction time when reacting to an image and recognising the person correctly (seconds).](image)

The Investigation, Interpretation and Intervention Involving Cholera

Introduction
To introduce this essay, some context and information must be given. Cholera is an infection of the small intestine. Its main symptom is watery diarrhoea for a few days, which can cause severe dehydration and sometimes death if not attended to. Cholera is mainly spread through water which is contaminated with human faeces. This means that factors such as sanitation and poverty can vastly increase cholera cases in an area.

These two factors mentioned were both entirely present in London in the 19th Century. Due to the very quickly increasing industry in London, everyone used the Thames for everything: sewage, industry, and, most importantly, drinking water. All of the water companies, such as Lambeth and Southwark & Vauxhall, supplied from different parts of the river. This led to the contaminated water getting just about everywhere, and getting worse as time went on, as there were no water treatment facilities or filters. This way of supplying water provided the perfect conditions for cholera to spread and infect thousands of people. There were several epidemics and even pandemics which affected London and killed many people. No one did anything about it as people believed that cholera was caused by bad air called miasma. These conditions allowed for Dr John Snow, a relatively unknown physician, to research these huge outbreaks. Snow did not believe in the so-called Miasma Theory, and wanted to disprove it. He believed that cholera was caused by contamination in the water, and not by bad airs and smell, as was commonly believed. These epidemics and deaths that cholera provided a reason for Snow to pursue research in the area, and to eventually become famous, start the field of epidemiology, and stop cholera from ravaging London and the rest of the world.

Methods
Snow collected most of his data during 1848-1854, during the height of the cholera epidemics. The first thing Snow did was monitor what water was provided where. He primarily observed Lambeth and Southwark & Vauxhall, as he saw that both covered nearby areas of London, with quite a lot of overlap. However, Lambeth moved their waterworks down the river Thames to a cleaner area. This allowed Snow to trace the water caused cholera, as he now had a control group (a neutral party which can be compared to other groups).

Snow also observed the 1854 Broad Street outbreak. This outbreak involved a single water pump on Broad Street which was contaminated with choleran, and killed 127 people. At first three people close to where the outbreak happened, so he did some research. He asked everyone in the area how many people had died of cholera, and found several other details of unusual cases by asking family members and friends of the affected.

PhD Tutor’s note
It is beyond the scope of the psychological report on face processing and included a variety of references to back up the claims she made throughout. Her report was of an equal standard to many of the undergraduate university reports that I saw on a regular basis. I... should be really proud of what she has achieved, and this recognition is very well deserved – congratulations L.!
Results

Though all of this information, Snow found that cholera was caused by contaminated water. He also found that specific water companies and pumps were more contaminated than companies which drew from other parts of the river. Through his first investigation, he found that the Southwark & Vauxhall water caused eight times more deaths than London, and its new waterworks. These results are shown in this graph:

![Graph showing increased deaths from contaminated water.](image)

This graph shows a vastly increased number of deaths from Southwark & Vauxhall compared to the other two sources. The rate of deaths is also much more significant, as they had 316 deaths per 10,000 people, Lambeth only had 37 deaths per 10,000, and the rest of London, with 256,000 people, still had a small rate of 59 deaths per 10,000, over five times less than Southwark & Vauxhall.

As the map shows, there are many deaths (shown by the red areas) that occurred in this area. Snow could use this map to find the source of cholera in the area, and therefore deduce where the outbreak started.

In the 1853-54 epidemic, Snow compared the cholera death rates between customers of the two companies. By observing the first 324 deaths of the 1853-54 cholera epidemic, Snow found that Southwark & Vauxhall’s water caused a whopping 286 deaths out of the first 314. Through further investigation, Southwark & Vauxhall had 1263 deaths out of 40,046 houses. In contrast, Lambeth had just 98 deaths out of 2607 houses.

In the Broad Street outbreak, Snow did a detailed investigation of the outbreak. None of the workers at the Broad Street Brewery got cholera, as they had a different water supply. The local workhouse only had five deaths among 532 employees, while an elderly widow in an area far away from the pump had the Broad Street water delivered, as she liked the water, and ended up dying of cholera, along with her visiting niece. One other detail is that people near other pumps almost never got cholera, with the exception of some people, who were said to have used the Broad Street pump because it was more convenient (which happened to three children[7]), or in a few specific circumstances because they preferred the Broad Street water.

Advice for the Government

There are several interventions that the government could use to stop cholera. Firstly, they could introduce vaccination; if people can get cholera by ingesting a weakened, dead or alternative virus to a patient in order to give them an immunity to that disease. This is a good solution, as vaccinating a population can completely stop outbreaks of cholera and death. However, there are some problems. Firstly, vaccination can be expensive, as you need to do an extravagant amount of research. Secondly, people can still refuse vaccination, which leaves them vulnerable, and they can end up spreading cholera throughout an area. This would make vaccination much less useful, as someone who refused could end up unwittingly acting as a catalyst to yet another outbreak.

A second solution is to supply clean water when there is a cholera outbreak. Having clean, bottled water delivered to peoples’ homes means that people will not drink the contaminated water, and therefore, they would not get cholera. This is a largely effective solution, except for one problem; this idea is quite expensive. Bottling and delivering enough water for an entire population would come at significant cost. One other problem is that people don’t necessarily need to drink this clean water, despite it being completely free, so there is a slight chance of someone still drinking the contaminated water and getting cholera. Like vaccinations, this is a solution that is not effective, as this infected person could end up spreading cholera again and starting another cholera epidemic, all because they chose to not drink the clean water.

Following on from this problem, another intervention could be to restrict the drinking of contaminated water. This would make people get cholera if drinking the water which contains it is disallowed. This means that it can’t spread, and therefore the epidemic is essentially stopped. However, as with every other concept, these infections cannot be completely ruled out, as water could cause some people to be anned or even outraged by this decision. For example, they tried this with the Broad Street pump, but this caused a great deal of resistance.

One of these was, “...we see no reason to adopt this belief. We do not find it established that the water was contaminated in the manner alleged ... nor is there before us any sufficient evidence.”

One other solution would be to thoroughly clean all of the water supplies which are determined to be infected. This is by far the most effective solution, as it entirely wipes out the cholera from the water supplies, and it does not rely on people wanting to take precautions and make sure to be infected. It also can not be affected by human error, such as bottling the wrong water, or not thoroughly testing the effects of a vaccination. However, this intervention still has its drawbacks; for example, this is the most expensive solution, by a huge margin, as it involves using chemicals to wipe out all of the pathogens, including cholera, in the water. Also, if people stop people from putting more contaminants into the water, and sewage into the newly cleaned water supplies. Yet another drawback is that depending on what is used, the water may be unusable for some time. In a worst case scenario, a cleaning agent could be released along with the water, and poison anyone who drank it.

References:
7. [http://www.ph.ucla.edu/epi/snow/broadstreetpump.html] [Accessed 16/07/16]
11. B. E. S. H. Khatun, Lister Community School, London Supervised by K. East, King’s College London

Smoking Still Kills: What can we do to help?

Cigarettes are extremely harmful substances which are known to contain dangerous additives, chemicals and very important harmful materials, including carbon monoxide. These are determined to be important to cause life-threatening illnesses and conditions, including heart disease, lung cancer and severe asthma attacks. Nicotine is an addictive drug found in cigarettes; it provides an immediate “kick” because it causes a discharge of epinephrine from the adrenal cortex. This stimulates the central nervous system and endocrine glands, which causes a sudden release of glucose. This is then followed by depression and fatigue, leading the user to seek more nicotine. In 1988, the Surgeon General reported concluded the fact that cigarettes and other forms of tobacco, such as pipe and chewing tobacco, are addictive and that nicotine is the drug in tobacco that causes the addiction. Research shows that when smokers crave cigarettes, they show impairment of basic bodily functions such as the ability to understand language.

Also, other studies show that when smokers are deprived of cigarettes they have increased anger and hostility. These are just a few ways in which this harmful drug affects smokers on a day-to-day basis. Also, the effects of nicotine mean that more smokers have an increased chance of long-term and short-term illnesses of tobacco which in all people living. Nicotine is also determined to be cause of cancer, coughing, vision problems, gum disease and much more. In addition, cigarettes also contain tar and many gases including carbon monoxide. The tar found in cigarettes is believed as all of these cases happened around one area of the UK, that could have been affected by other factors.

PhD Tutor’s note

S is a bright and articulate student who very quickly understood the core concepts of this book. She links to the core concepts clearly and creatively, and presents his ideas effectively in writing. Also he has excellent oral communication and team working skills. I’m sure he will go far! Well done!
In May 2016, in the UK, plain packaging on cigarette packets was introduced to act as a deterrent and prevent people from buying cigarettes. The cigarette packs have health warnings and were developed using the “most-punishing colour”. The aim of plain packaging primarily targets teenagers and young people as it does not entice them into buying cigarettes, rather it acts as a restraint. Evidence from Australia shows that plain packaging of tobacco industry identifies packaging as an important part of tobacco promotion. Plain packaging reduces the ability of the tobacco industry to market their products through the use of health warnings which increases quitting behaviour (Australian Department of Health, 2017). Research in which adolescents were instructed to use plain cigarette packs and were asked about their feelings towards them confirmed results that plain packaging increased negative perceptions and feelings about smoking. It also contributes to the belief that cigarettes are less addictive and increases the likelihood of quitting smoking. After this policy was introduced, smoking in front of others and hiding their cigarette packs.

Comparing branded cigarette packs alongside plain packaging, consumers received a positive reaction. The packs are significantly more attractive. Studies also show that unappealing packaging either reduces tobacco consumption or instigates the behaviours mentioned previously. In addition to placing feel cigarettes taste worse in plain packaging and a likely outcome of this policy is that there will be less demand of tobacco products. Although this policy has had a positive effect on quitting behaviour, it has come under scrutiny from the tobacco industry. Tobacco companies expressed concern that plain packaging would increase the sales of counterfeit cigarettes. In addition, Roy, Ramm, former commander of Specialist Operations at New Scotland Yard and founding member of The Common Sense Alliance stated that it would be “disastrous if the government introduces plain packaging on tobacco. The lack of differentiation and price increases in recent years and substantial increases in state and federal taxes on tobacco products, these developments have and will likely continue to have an adverse effect on the sale of tobacco products (Boon et al., 2017).” Although the public are not completely satisfied about spending an increased amount on cigarettes, the majority are willing to pay as long as the government that have responded by contributing to end smoking. In addition, the government have reacted to this policy positively as they are gaining money from the increased tax on cigarettes and are able to spend this money on public services including the NHS.

Other factors that contribute to the reason why smoking is harmful is the fact that it leads to passive-second hand smoking. Second-hand smoke can cause lung cancer and heart disease amongst non-smoking adults and The Environmental Protection. Australia has concluded that it causes sudden infant death syndrome, ear problems, and slow lung growth amongst children (Tobaccofreemaine, 2017). Second-hand tobacco smoke is also dangerous when exposed to pregnant women can cause early preterm delivery. Also, passive smoke exposure causes 600,000 premature deaths per year (Mojtaba et al., 2017). Due to the extremely dangerous effects of smoking, many policies have been introduced to stop smoking and effectively stop the dangerous impacts of smoking. The policies that will be discussed are as follows: (increased) taxation on cigarettes, plain packaging on cigarette packets and smoke free policies.

Taxation on cigarettes has been authorized to prevent people from buying cigarettes (especially adolescents and teenagers). It also generates a large sum of money for the NHS and other public services, from those who are purchasing cigarettes. The total amount of tax on the average cigarette pack in the UK, is £0.17, approximately 77% of the retail price. Joanna Cohen of the Johns Hopkins Institute for Global Tobacco Control has stated that “Taxes are a win-win. Tobacco taxes limit governments’ income from the revenue so taxes are our most effective strategy and a win-win proposition” (WOA, 2017). Also, based on clear evidence, the Surgeon General has called raising prices on cigarettes “one of the most effective tobacco control interventions” because increasing price is an effective method to reduce tobacco consumption among lower income and target teenagers to young age to smoking. It also reduces tobacco consumption among pregnant women which prevents thousands of abortions due to smoking and effectively stop the dangerous impacts of smoking, especially children and pregnant women.

Due to the extremely dangerous effects of smoking, many policies have gone under critical observation by the public and tobacco industry for the reasons mentioned previously, overall, they’ve had a positive impact on smokers and non-smokers by providing a cleaner environment and contributing to end smoking and its dangerous, threatening effects. In addition, these policies work together and aim to encourage users to quit smoking and provide a supportive environment.

References:
Cole, M., R.A. (2017). Tobacco Control has stated that: “Taxes are a win-win proposition” (VOA, 2017). Also, based on clear evidence, the Surgeon General has called raising prices on cigarettes “one of the most effective tobacco control interventions” because increasing price is an effective method to reduce tobacco consumption among lower income and target teenagers to young age to smoking. It also reduces tobacco consumption among pregnant women which prevents thousands of abortions due to smoking and effectively stop the dangerous impacts of smoking, especially children and pregnant women.

In conclusion, the long term and short term effects of smoking are vicious and extremely harmful to smokers and others around them. These policies, along with others have been put in place to prevent continued smoking and have reduced cigarette purchase and consumption and has had an overall positive impact- the British Medical Journal

explained that before plain packaging implementation in other countries such as Australia, 20% of smokers wanted to quit, but after this policy was introduced 27% of smokers wanted to quit smoking (Wikipedia, 2017). This illustrates how the policy will have a positive impact on the UK. This also shows that people have had a positive reaction to the policy in the sense that their behaviour towards smoking has changed. Another policy that has had a positive effect is the ban on retail advertising of tobacco, which has been commissioned is the smoke free policy. The UK smoke free policy was fully implemented in 2015. It banned people from smoking in public places, including, cars, to reduce passive smoking, especially the levels of tobacco smoke inhaled by children. The policy not only reduces smoke exposure amongst non-smokers but also encourages people to quit as the policy is not convenient to smokers. Also, the policy interferes with social norms, as if people are restricted from smoking, smoking is deemed rejected by society which discoursed people from smoking. After this policy was introduced, Stop-smoking services reported that client numbers had increased by 15% and there was also a 17% reduction in heart attacks amongst non-smokers (Pell et al., 2008). In addition, the air quality in pubs has massively increased after the ban. This is clearly illustrated in evidence that shows that before the policy was introduced, non-smoking bar workers were inhaling 4–6 times more tobacco smoke than the average non-smoker. However, after the smoke free policies had been implemented the levels of tobacco smoke were reduced by 76%. The public have had an extremely positive reaction to this policy and the majority of the public comply to this law as research shows that 87% of all public premises and venues are smoke free. The majority of the public support smoke free policies in public places. Many people believe that smoke free law has led to health benefits for themselves and those around them. The perception of smoking as an unhygienic and unhealthy activity is harmful is the fact that it leads to passive-second hand smoking. Second-hand smoke can cause lung cancer and heart disease amongst non-smoking adults and The Environmental Protection. Australia has concluded that it causes sudden infant death syndrome, ear problems, and slow lung growth amongst children (Tobaccofreemaine, 2017). Second-hand tobacco smoke is also dangerous when exposed to pregnant women can cause early preterm delivery. Also, passive smoke exposure causes 600,000 premature deaths per year (Mojtaba et al., 2017). Due to the extremely dangerous effects of smoking, many policies have gone under critical observation by the public and tobacco industry for the reasons mentioned previously, overall, they’ve had a positive impact on smokers and non-smokers by providing a cleaner environment and contributing to end smoking and its dangerous, threatening effects. In addition, these policies work together and aim to encourage users to quit smoking and provide a supportive environment.

This shows the impact this policy has had on the public's view on smoking and its harmful nature. In addition, businesses have received a positive reaction from workers after the implementation of smoke free law— 97% of businesses reported positive reactions from staff (UK Department of Health, 2017). Although the policy shows significant results in the amount of people smoking or taking up smoking, some people disagree with smoke free law in pubs compared to areas such as banks and post offices where smoking is not allowed smoking may not be put in place for those who wish to smoke in pubs and that the policy has caused many pubs to close due to lack of business. R.J. Cigars and Pub Association director, Bridgid Simmonds states that it will be unlikely that smoke free law would be reversed and admitted that it “hit the pub trade hard” and led to pub closure (MorningAdvertiser, 2017). Tobacco free laws in place in Australia, the public and business have received a positive reaction and comply with this law and believe that it has had a positive effect on the environment and people's health. The smoke free law prohibits smoking on public premises and in cars, saving thousands of non-smokers (second-hand smokers) and smokers every year. Although some of these policies have gone under critical observation by the public and tobacco industry for the reasons mentioned previously, overall, they’ve had a positive impact on smokers and non-smokers by providing a cleaner environment and contributing to end smoking and its dangerous, threatening effects. In addition, these policies work together and aim to encourage users to quit smoking and provide a supportive environment.

PhD Tutor's note
Teaching at Lister Community School was incredibly enjoyable and rewarding. All of the pupils were very bright and engaged with the lessons brilliantly from the start, and I was amazed with the high-quality work that was produced in many of the pupils’ assignments. One assignment was of a notably high standard. She demonstrated an excellent understanding of the topic, outstanding critical thinking and evaluation skills, and an ability to reference appropriately. She thoroughly deserved her First-class Mark of 84% and, it's a great pleasure to see her work published in The Scholar.
Assessment of the Challenges to the Realisation of Nuclear Fusion: Nuclear Safety for Fusion

Year 12, Key Stage 4
M. Weichowski, Sir Christopher Hatton Academy, Wellington, superintended by R. Pearson, Open University

Abstract
Development and selection of suitable materials to withstand the conditions of a fusion environment is a key step to turning nuclear fusion energy from a theoretical and unreachable energy source into an economically accessible energy option with the potential to meet the raising energy demands of the world’s growing population. Assessment of challenges and opportunities associated with fusion materials are given throughout this report, through analysis of different literatures and scientific findings in the field, highlighting the current progress made within fusion materials development, as well as providing an overview of most significant challenges still to be resolved and recent plans for finding solutions to these issues.

Introduction
The high usage of fossil fuels brings many environmental concerns such as: climate change, acid rain and many more, developing a greater interest in renewable and non-fossil energy sources [2, 4]. Nuclear power is one of the areas of interest and a strong contender as a main environmentally sustainable energy source [2, 7]. However, nuclear power is often criticised due to issues such as: radiation safety, disposal of waste, and high energy yields. As a result, nuclear power is not welcome by many. With the rise of nuclear power plants and using them as testing facilities for newly designed fusion reactors, the requirements for fusion materials have increased. The plasma facing components of the reactor are heavily affected by radiation damage. High fluxes of neutrons and charged particles which have escaped from the plasma bombard the plasma facing components causing “sputtering” of atoms in the materials of the plasma facing components, which cause material to be lost as sputtered atoms on the plasma surface. This is not the only effect, since high temperatures, therefore materials selected must have sufficient creep resistance (“Material’s ability to resist any kind of deformation when under a load over an extended period of time”) and good resistance against high temperatures [2, 12]. The divertor, for example, has to be capable of handling thermal energy loads as high as 204 MW, as well as coming directly into contact with the plasma itself [13, 14]. This results in elements of materials, for example the divertor tiles, requiring frequent replacement due to damage from the high heat loads, but also due to high fusion neutron loads [10, 13, 15].

Challenges associated with fusion power can be roughly grouped into three main categories: “plasma control, power extraction and material selection” [7]. Materials for fusion reactors are required to face many challenges, because of the complex environment consisting of radiation, high heat loads, but also due to high fusion neutron loads [7]. Even though fusion energy possesses the possibility to meet the growing energy demands, it is rarely included in any energy assessments, as it is a far too theoretical idea, with too many challenges still unresolved [2]. Therefore, further research and technological development is still needed before fusion energy is available for usage [2, 7].

Discussion
Although extensive research has been started in the field of fusion materials, there are still many key challenges associated with the topic and current progress, the unresolved or just beginning to be looked at. Apart from research based around finding new materials, there has been an increased interest in learning from fusion power plants and using them as testing facilities for newly proposed materials, by irradiating them with fusion neutrons. Moreover, recycling and cleaning activated materials has recently started to be researched further, with plans to use irradiated spent fuel for production of radioactive waste being deposited underground [9, 17].

Modeling and testing
One of the most significant challenges for fusion materials is testing and modelling them. The International fusion materials irradiation facility (IFMIF) are currently developing a greater interest in renewable and non-fossil energy sources [2, 4]. Nuclear power is one of the areas of interest and a strong contender as a main environmentally sustainable energy source [2, 7]. However, nuclear power is often criticised due to issues such as: radiation safety, disposal of waste, and high energy yields. As a result, nuclear power is not welcome by many. With the rise of nuclear power plants and using them as testing facilities for newly designed fusion reactors, the requirements for fusion materials have increased. The plasma facing components of the reactor are heavily affected by radiation damage. High fluxes of neutrons and charged particles which have escaped from the plasma bombard the plasma facing components causing “sputtering” of atoms in the materials of the plasma facing components, which cause material to be lost as sputtered atoms on the plasma surface. This is not the only effect, since high temperatures, therefore materials selected must have sufficient creep resistance (“Material’s ability to resist any kind of deformation when under a load over an extended period of time”) and good resistance against high temperatures [2, 12]. The divertor, for example, has to be capable of handling thermal energy loads as high as 204 MW, as well as coming directly into contact with the plasma itself [13, 14]. This results in elements of materials, for example the divertor tiles, requiring frequent replacement due to damage from the high heat loads, but also due to high fusion neutron loads [10, 13, 15].

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Different materials experience radiation embrittlement, and thermal creep at different temperatures, providing a challenging situation, as not all materials can be used together. Figure 2 illustrates the operating window for some fusion materials being considered for use, portraying that some materials operate in the more extreme conditions of temperature and experience radiation embrittlement and thermal creep at different times, therefore further research in developing new materials has to be maintained, improving the performance of a material lacking in to bring different operation frames closer together [18].

Radioactive waste and recycling
Tritium retention and high neutron loading in fusion materials production radioactive waste which has to be disposed of [19]. The production of even low level radioactive waste defeats one of the fundamental principles of fusion: producing clean energy, without creating any harmful waste products [7]. With high environmental and political concerns surrounding the management and the deposition of radioactive materials underground, the idea of recycling and cleaning has been created [17, 1]. Recycling and cleaning used materials helps to solve two issues with fusion materials. Firstly, it lowers the amount of radioactive waste produced, and secondly it helps to replenish the supply of rare materials required for replacements of damaged components [14, 19]. For example, 560 tonnes of benelox was to be replenished every five years due to radiation induced swelling. Nevertheless, for recycling and cleaning to be able to take place remote handling techniques and technologies have to first be developed fully [9, 11, 13, 17].

Impurities in materials such as Niobium (Nb), Molybdenum (Mo), and silver (Ag), common in metallic alloys, highly increase the activation level of the materials. A solution to this is using the developed low activation materials discussed in the literature review [4, 8]. By using low activation materials the issue of strain on material supplies is also partially resolved, as the components don’t have to be replaced as often due to radiation damage. In addition to less atom sputtering produced. However, using only materials from these three groups restrains material usage options [8].

Conclusions
There are still numerous challenges in the way of achieving an economically feasible and sustainable energy source, which could save humanity and survive to provide suitable and reliable energy for the years to come. Without appropriate materials to withstand the harsh fusion environment, radiation damage effects such as thermal and radiation creep, radiation embrittlement and volumetric swelling, would greatly hinder the reactors’ efficiency and ability to produce fusion energy. The high demand for fusion material testing facilities and infrastructure like the ones that have to be built and being produced, will definitely lead research into that path. The modelling and testing facilities will enable scientists to check conditions against similar and identical in some cases, such as testing with JET/Neuton radiation, to fusion reaction conditions, helping to develop and test new materials, which is another path I believe fusion research materials will follow, due to the specialised characteristics material have to contain to survive the severe fusion conditions.

References

Table 1- Advantages and disadvantages of fusion materials in terms of properties

<table>
<thead>
<tr>
<th>Property</th>
<th>Advantage</th>
<th>Disadvantage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Availability</td>
<td>Limited</td>
<td>High cost</td>
</tr>
<tr>
<td>Reactivity</td>
<td>Low</td>
<td>Increased heat losses</td>
</tr>
<tr>
<td>Corrosion resistance</td>
<td>Strong</td>
<td>Costly</td>
</tr>
<tr>
<td>Thermal stability</td>
<td>Good</td>
<td>Limited life span</td>
</tr>
<tr>
<td>Mechanical strength</td>
<td>High</td>
<td>Limited life span</td>
</tr>
<tr>
<td>Electrical conductivity</td>
<td>Low</td>
<td>High cost</td>
</tr>
</tbody>
</table>

Table 2- Structural material operating temperature window

<table>
<thead>
<tr>
<th>Material</th>
<th>Temperature Range (°C)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ni (Zn)</td>
<td>100-500</td>
</tr>
<tr>
<td>Ta (Zr)</td>
<td>1000-1500</td>
</tr>
<tr>
<td>Nb (Mo)</td>
<td>900-1300</td>
</tr>
<tr>
<td>Fe (Cr)</td>
<td>1000-1400</td>
</tr>
<tr>
<td>Cs (Te)</td>
<td>1200-1500</td>
</tr>
<tr>
<td>O2 (N2)</td>
<td>1000-1300</td>
</tr>
</tbody>
</table>

Population Genetics

Introduction
Population genetics is the study of variation and the distribution of alleles in particular populations and is regarded as the branch of evolutionary biology that implements a range of different theories to explain why certain things happen to populations (for example, variation will always occur), and how these events and interactions can affect the genetic variety and alleles in the population. It also demonstrates how certain occurrences (which happen because of the interaction between genetics and their environment) such as natural selection (due to natural disasters, hunting, and food shortage), mutation (of genes) and other characteristics of the genetic variability available in the population and therefore sufferable consequences. Understanding these consequences helps us to identify ways of preventing them, from occurring and helps us to maintain the balance of life.

Hardy-Weinberg Principle
The Hardy-Weinberg principle is a branch of evolutionary biology that states that multiple different alleles can exist in a population and that there are, for them [the allele], that can be colored. This can be displayed in the following way as an allele [as shown below] to present how the interactions between different alleles affect the growth or decay of their populations and growth in the communities overall.

In population genetics studies, it is important to be able to identify genetic variations in populations and to analyze and quantify them by the frequency of alleles present. Any correlation is possible that one of these genetic variations may result in different phenotypic traits, for example different pigmentation. However, this is a very difficult question, only if the genotype interacts with the environment, the growth or decay of their populations can be determined. Overall this is a difficult question, and that can be solved by the Hardy-Weinberg equation as shown below.

Five conditions are required in order for a population to remain at Hardy-Weinberg equilibrium: A large population

- No migration (the population remains constant)
- No mutation (alleles do not change)
- No natural selection (environments are not changing)
- No genetic drift (random events do not change the allele frequencies)
- Large population size (the effects of random events are minimized)
from which to breed
1) Random, not selective breeding and mating
2) No mutations occurring that change allelic frequency
3) No immigration or emigration out of the area
4) No natural selection that decreases genetic variety

In addition, the basis of the model states that in a particular population, the frequencies of alleles and genotypes maintain a consistency between generations (as long as no other external stimuli are involved, such as evolutionary influences).

The following equation is used to estimate the frequency of different alleles (variations) of a gene in a population: 

\[ p + q = 1 \]

Where \( p \) is the frequency of the dominant allele 
And \( q \) is the frequency of the recessive allele

To find \( p \), we rearrange the equation:

\[ p = 1 - q \]

As you can see, binomial expansion (which is a shorter method of expanding binomial expressions that have been raised to some power as it would take too long to write out the entire thing) is used to expand the equation and to indicate how often each of the three genotypes appear: 
\[ p^2 \] is the frequency of the homozygous (two of the same allele) dominant AA. 
\[ 2pq \] is the frequency of the heterozygous (two different alleles, one dominant, one recessive) Aa. 
\[ q^2 \] is the frequency of the homozygous (two of the same allele) recessive aa.

This helps us determine the amount of possibilities of genes and how many different variations are likely to exist of them in a population, and helps to keep track of the organisms living in the environment and what can be done to help prevent the extinction or conserve them. (Such as trying to prevent the natural selection by decreasing the likelihood of natural disasters occurring, like floods - which could be controlled by adding barrier defences or campaigning to raise awareness for the environment and stop global warming).

Working example:

**Question:** In a population of ladybirds, the colour red (R) is dominant over the colour yellow (Y). 20% of all of the ladybirds in the particular population are yellow. Calculate the percentage of butterflies in the population that are heterozygous (one dominant gene and one recessive gene) and the frequency of homozygous dominant (two dominant genes) individuals.

**Answer:** The equation is 

\[ p^2 + 2pq + q^2 = 1 \]

So in order to obtain values for \( p \) and \( q \), we look at the information given to us in the question. 
Yellow is the recessive gene which means that it takes a homozygous recessive complex for a ladybird to be yellow. As 20% of the population of ladybirds are yellow, \( q^2 = 0.2 \). To work out \( q \), we find the square root of 0.2 which is 0.447213595. This is the frequency of the recessive allele (Y). 

\[ p + q = 1 \]

As mentioned previously, it is assumed that the prey have unlimited food supply from which they can grow in number exponentially. This is exponential growth and is displayed in the prey equation by the expression \( x \). It is further assumed that the rate of predation (the number of predators successfully preying on other animals for food) is proportional to the rate of predators and prey meeting or interacting. This is shown in the prey equation above, by \( y \) and thus allows us to see that the exponential growth of the prey \( x \) minus the rate at which the prey is preyed upon (in simpler terms, the rate at which predation occurs) gives you the total change in the number of prey present in a population.

Moving on to the predator equation, the term \( x \) is used to present the change of growth in the predator population. This equation is very similar to that of the prey equation, however since the predator is less likely to be preyed on by a larger form of predator, the equation differs slightly as a different constant has to be employed because the rate of growth of the predator population is not always exactly equal to the rate of consumption of prey. The expression used to show the absence or ‘loss rate’ of members of the predator population is \( y \). Reasons for these absences vary, for example it could be due to death from natural circumstances or something less morbid like emigrating to a different location. Either way, the results are the same as there is exponential decay - the complete opposite of the ‘exponential growth’ the prey population face.

Therefore, the predator equation suggests that the change in growth \( y \) minus absence/natural death/emigration etc. \( y \) gives you the change in the number of predators present in a population.

**Conclusion**

It is clear that both the Hardy-Weinberg model and the Lotka-Volterra model explain how interactions between species and certain events taking place can heavily impact the allele frequency and diversity in a population. The Hardy-Weinberg theory is used to measure the availability of genetic variation and suggests a population may remain at equilibrium as long as there are several factors present. Predator-prey cycles explain how predation, a factor that is not taken into consideration in the Hardy-Weinberg principle - can reduce the allele frequency of a population by killing off many of its members. However, on the other hand, as one of the conditions for Hardy-Weinberg equilibrium is that no natural selection takes place, it can be suggested that predation is a form of natural selection, which would mean that the relationship between the two models, though it is not often recognised, is quite complementary as one helps to explain the other and vice versa.

**Bibliography**


**PhD Tutor’s note**

PhD Tutor’s note: Khan has produced a polished essay based on her own self-motivated research and has referenced her use of external resources meticulously. The essay is well thought-out with an interesting attempt to link Predator-Prey dynamics and the Hardy-Weinberg principle. I am impressed that critical judgement has been shown to highlight both the strengths and the weaknesses in the assumptions behind those theories. Overall, it is a coherent essay and provides excellent pedagogical value for the reader.
If I was given the opportunity, would I go to space?

Year 12, Key Stage 6
S. Abdullagul, Longfield Academy, Kent
Supervised by R. Naii, Longfield Academy

Ever since the Russians first Vostok orbit around the Earth in 1961 humans have been venturing into space, achieving what was once unimaginable. After 37 years and 38 missions, they had managed to launch the first of many installments in what was to become known as the International Space Station (ISS). Two years following the initial ISS launch, humans started living in the ISS and in the 17 years since there has been a continuous human presence in space. The crew managing the station consist of the majority of which are Russian or American with the rest consisting of either European, Japanese or Canadian members. The crew carry out vital experiments and install new components to the ISS that help us have a better understanding of space. In the 56 years since the first human in space, scientists have not only learned more about our planet but also our galaxy and our universe and about human physiology and psychology in space. If given the opportunity I would love to help with the ongoing, never-ending venture for knowledge of the universe, however, I don’t think I would be a viable candidate for a space exploration or even a stay at the ISS.

Conditions on Earth and space are unquestionably different and this causes a high quantity of complications for space ventures. If a human were to suddenly end up in outer space in a pair of jeans and a t-shirt they would undoubtedly die within minutes, the gases in their body would rapidly expand causing the person to almost explode. Then the lack of oxygen would infect an internal organ which would result in oxygen deprivation and would cause the person to lose consciousness. After just 20 seconds from the moment they ended up in space, the individual would be dead from living.

Evidently, they don’t send astronauts into the harsh environment without a spacesuit. Space suits provide an optimum and mobile environment for the astronauts wearing them. They regulate body temperature preventing the body from overheating. Without this the suit’s insulation, and also protecting the body from 12°C heat [2] using the cooling water tubes worn inside the suit. The suits also offer protection from space dust that travels at speeds faster than 1,700 mph [2] and could easily penetrate a person not wearing a spacesuit. In space, the suit’s light is as bright and dangerous as ever not only producing intensely bright light, but also strong x-rays. Due to this the spacesuit are equipped with gold-lined visors to combat this issue and protect the astronauts’ eyes.

The space suit does not solve the issues with the conditions of space inside the ISS. For one, the inside of the ISS and all of space has microgravity which imposes an issue as the human body relies on gravity for its fluids and fluids around the body. With microgravity, the body’s fluids, such as the blood, tend to pool towards the head and chest. This causes blocked sinuses and a weaker heart as it doesn’t need to pump the blood around the body that hard, but when the body is re-introduced to the force of gravity the body’s fluids return to being evenly distributed and the problem disappears. However, the “zero gravity” in space can cause long-term damage to muscles that contract and recreate in response to eye pressure. This can pose a problem when an astronaut returns to Earth from space, as it can permanently alter the shape of the eye and thus affect how the eye focuses light on the retina causing them to experience long or short sightedness.

British astronaut Tim Peake experienced back problems on return from his stay on the ISS [3] because the spaces between in his vertebrae increase in length due to the lack of gravity. In space, this doesn’t cause any issues apart from a lowering of the spine, however once again it is not a straightforward rehabilitation, complete re-adaption can take as long 3 years and results are not guaranteed [3].

Astronauts are in their prime and are the physical representation of health. However, I, on the other hand, am far from that. My body wouldn’t be strong enough to withstand the physical demands of an astronaut with the two hours of compulsory daily cardio and weight training. Not only that, but I don’t believe that my body would be able to withstand the intense cold of -157°C for even 15 minutes. Although I’m not the fittest of people and a reduced oxygen flow would not help with that fact. This is why I do not think that I am physically capable of performing the vital role of an astronaut. However, working on the mission from Earth, helping to plan and prepare for a mission would be a more suitable and fitting role for me.

The launch and reentry are the most complicated and dangerous part of a space mission. Without proper training and preparation, it is not suitable for some potentially fatal and disastrous, like the 2003 Columbia launch in Louisiana. During this launch, a small piece of insulating foam from the external tank came loose and hit a wing of the orbiter. [8] The extreme heat from the re-entry accompanied with atmospheric gases destroyed the wing causing large long term damages to the shuttle. As a result, the astronauts died in the instance of fire in eye pressure. This can pose a problem when an astronaut returns to Earth from space, as it can permanently alter the shape of the eye and thus affect how the eye focuses light on the retina causing them to experience long or short sightedness.

When trying to return to Earth after a space mission, it is the crew on Earth’s job to ensure the angle of re-entry is correctly calculated to ensure the descent is as comfortable as it can get. The angle is normally 40°[11] but in order to land in the correct location many mathematical calculations are involved. If the angle is too shallow then the spacecraft will not enter the atmosphere but instead be accelerated off of its surface, too steep and the astronauts could have a ballistics re-entry and face up to 10G which is enough to render the astronauts unconscious [11] inside a spacecraft that has entered the atmosphere correctly the astronauts are exposed to a much milder Gs, which is enough to just about lose your vision [11]. With the spacecraft reaching speeds of around 8000 m/s [11] the force is strong enough to pin the astronaut’s body deep into their chairs and causes them to not be able to move at all as if they were temporarily paralysed. Not only do astronauts have to be fit to withstand that, they need to be able to land and find their way out of the spacecraft and potentially find their way to the town with the help from the trained astronaut on the calculated landing site. It is for this reason that I would not like to travel in space as the re-entry is notorious for its complexity and the extreme conditions that astronauts have to go through in order to return home.

In order for a space mission to be successful it is not only the astronauts that need to be protected from the conditions of space but also the equipment they use. There are satellites that must be designed with the conditions of space in mind to be able to protect the payload that they contain. Payloads are the ‘brain’ of the satellite, they are the very reason for the satellite to be in space, they are made by NASA and other national space agencies to receive data from space and send it to receivers based on Earth. They are the most important part of a satellite or instrument which is why their protection is taken very seriously. They need the flawless shielding and protection to stop any damage. Without these they wouldn’t be able to perform their function. This is another reason why I would rather help astronauts enter space by making improvements to the design of the shuttle to allow astronauts to feel safe and trust the crew on Earth with their lives knowing that a tragedy like that will not happen again.

If I was given the opportunity, would I go to space? [Scholar]

If I was given the opportunity, would I go to space? [Scholar]
The growth of tissues may be isotropic or anisotropic; isotropic meaning that growth is invariant with respect to direction, whereas anisotropic is variant growth in different directions [1]. One explanation of anisotopic growth directions is the theory of plant tissue and cellular polarity. Polarity is the asymmetric distribution of cellular components along an axis in a cell, or the distribution of whole cells in a tissue, leading the most ofoplant to point in the same direction. The plant's overall shape [2]. There are many different models of how cells may orient themselves individually and cooperate to form other parts of the plant. This model suggests that plants must have a way of coordinating their growth in order to achieve the diversity required for survival.

In addition to the factors already mentioned, plants also maintain the balance of chemical concentrations. Our ability to control this concentration allows us to change the growth of plants in space. For example, a cotton plant cannot be used for construction but has other uses in clothing. The shapes appear different once the plant is more developed but are very apparent while the plant’s meristems are just beginning to differentiate. The shapes of plants develop at the level of both cells and tissues. Tissues should also be monitored and regulated for the shape of the overall plant and so is essential for the creation of plant diversity. Throughout this essay, the factors determining growth at the cell and tissue level will be discussed along with the techniques used to study them, such as computer modeling and microscopy.
I suggest that the polarity field in the petal runs along the proximal-distal axis, diverging at the base and converging more at the tip. This asymmetric polarity leads to anisotropic growth of the petal, affecting both division and elongation rates. There is a very low growth rate at the base of the petal and perhaps complete inhibition between petals, whereas there is a higher growth rate in the middle of the petal that spreads out towards the edges. The growth rate sharply decreases when reaching the tip of the petal but it is not completely inhibited.

There are many suggested explanations as to how individual cells align themselves to form the correct overall organisation in a tissue; however, there may also be another purpose to collective alignment of tissues that need to collaborate. The arrangement of polarised proteins, PIN1 in the stele of wild-type roots, PIN1 is exclusively found on one side of the cell which will lead to longitudinal growth. The PIN microtubules are perpendicularly to the direction of cell elongation and also polarised and are placed parallel to the microtubules, leading to an apparent constraint of growth where microtubules are most dense. The differential growth rates of individual cells allow the formation of this tissue in a particular shape, leading to the diverse shapes of plants. Microtubules have an important role in this.

Microtubules are not just essential for cell expansion, but also cell division. The direction of cell division is determined by the preprophase band at the beginning of mitosis [14]. This band is primarily made of microtubules [15] and so they are needed for the initial division of the cell. A phragmoplast forms during cytokinesis which is a template for the assembly of the cell wall in the plasma membrane and microtubules [17], and so microtubules are needed not only for controlled cell expansion but also for various aspects of cell division.

Plant cells also contain expansins to further control the expansion of cells via the loosening of the cell walls. Expansins are proteins in the cell wall that induce expansion of the cells; however, their exact mechanism of how they do this is unknown [18]. It is clear that a key characteristic of expansin action is the increased stress relaxation in the cell wall which continues with the presence of expansins [18]. One theory is that expansins weaken the non-covalent forces between glucans (such as cellulose) which is supported by some evidence but has not been proven [18]. There are two types of expansins, α-expansins and β-expansins [18]. One hypothesis suggests that grass pollen allergens are distant expansins and have an increased stress relaxation in the cell wall which continues with the presence of expansins [18]. One theory is that expansins weaken the non-covalent forces between glucans (such as cellulose) which is supported by some evidence but has not been proven [18].

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To what extent does Harry Potter and the Philosopher's Stone use cinematography, Editing and Mise-en-scene to Manipulate the Responses of the Viewers?

Year 9, Key Stage 3

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Supervised by E. Nicholls, Lancaster University

The idea of magic is interesting to the viewer – they very likely wish to be Harry, so they find shared interests in the characters to make themselves feel more magical. I believe this is why the audience want him to be a major part in the world. This is much stronger in the scene where Harry is first confronted with the characters – especially Harry because what is a better way to empathise with someone than if you see yourself in them?

After the title sequence time has passed – Harry is now 11 years old and living with the Dursleys. The Dursleys family is a very mean and not at all nice family. Harry’s development in the film is key for the film. A scene with Mr Dursley on Dudley’s birthday, Dudley pushes Harry over to get him out of the way. We look down on him as he falls as the audience will see how helpless he is in that moment. We pity him, however although this is the same technique used as when we first saw Harry as a baby there is a major difference – the camera then pans down so we are at his eye level. This shows the audience that despite the mise-en-scene, with Harry wearing an oversized T-shirt (we assume to be previously owned by Dudley) and Harry as he gets told off for smiling at his cousin’s misfortune. The reverse shot is used to show Harry’s smile vanish as he gets up to leave. This shows the audience that Mr Dursley, reinforced as a villain and, with Harry as the protagonist, means that so far in the film good and evil have been presented in a very black and white. 

After the accident with the snake at the zoo Harry is yelled at by Mr Dursley before being shoved under the stairs for mentioning he suspects that muggles believe “magic doesn’t exist” and the bars on the shutter create shadows on Harry’s face. The low-key lighting and close up camera shot creates “both a sense of place and a mood” and also “[s] the feeling of a character’s emotional state”. We feel how upset Harry feels with the Dursleys. After his statement Mr Dursley slams the shutter putting both the audience and Harry into darkness.

Harry is the character we follow through the film. We see his development, and see very clearly in mise-en-scene how Harry has changed, how he becomes stronger. The trust portrayed by Harry towards Hagrid and the bond between both (in a very similar way to the bond between Harry and Dursley) is very important. Even when the camera changes angle for the audience, seeing the world through his eye level also makes it easier for the viewer to relate to him. When Harry gets up the camera angles show the power imbalance between Harry and Mr Dursley as he gets told off for smiling at his cousin’s misfortune. A reverse shot is used to show Harry’s smile vanish as he gets up to leave. The audience will see how helpless he is in that moment. We pity him. However, although this is the same technique used as when we first saw Harry as a baby there is a major difference – the camera then pans down so we are at his eye level. This shows the audience that despite the mise-en-scene, with Harry wearing an oversized T-shirt (we assume to be previously owned by Dudley) and Harry as he gets told off for smiling at his cousin’s misfortune. The reverse shot is used to show Harry’s smile vanish as he gets up to leave. This shows the audience that Mr Dursley, reinforced as a villain and, with Harry as the protagonist, means that so far in the film good and evil have been presented in a very black and white. 

The film starts with our first meeting with Harry. A high shot looking down on baby Harry is used to make him look helpless and weak. This contrasts with later in the film, when he does something amazing that appeared impossible. The camera zooms into an extreme close up of Harry’s scar, which edits to a flash of white light and the title screen. The cinematography and the mise-en-scene work together to show Harry as very newly born because he is wrapped unclothed in a swaddling cloth in the scene. The audience will see how helpless he is in that moment. We pity him. However, although this is the same technique used as when we first saw Harry as a baby there is a major difference – the camera then pans down so we are at his eye level. This shows the audience that despite the mise-en-scene, with Harry wearing an oversized T-shirt (we assume to be previously owned by Dudley) and Harry as he gets told off for smiling at his cousin’s misfortune. The reverse shot is used to show Harry’s smile vanish as he gets up to leave. This shows the audience that Mr Dursley, reinforced as a villain and, with Harry as the protagonist, means that so far in the film good and evil have been presented in a very black and white. 

The set, costumes, lighting and cinematography for London are very important. As a result, the viewers are pleased and not surprised when Hagrid – a member of staff – breaks the rules to tell Harry about magic. The film starts with our first meeting with Harry. A high shot looking down on baby Harry is used to make him look helpless and weak. This contrasts with later in the film, when he does something amazing that appeared impossible. The camera zooms into an extreme close up of Harry’s scar, which edits to a flash of white light and the title screen. The cinematography and the mise-en-scene work together to show Harry as very newly born because he is wrapped unclothed in a swaddling cloth in the scene. The audience will see how helpless he is in that moment. We pity him. However, although this is the same technique used as when we first saw Harry as a baby there is a major difference – the camera then pans down so we are at his eye level. This shows the audience that despite the mise-en-scene, with Harry wearing an oversized T-shirt (we assume to be previously owned by Dudley) and Harry as he gets told off for smiling at his cousin’s misfortune. The reverse shot is used to show Harry’s smile vanish as he gets up to leave. This shows the audience that Mr Dursley, reinforced as a villain and, with Harry as the protagonist, means that so far in the film good and evil have been presented in a very black and white.
Hagrid takes Harry to Gringotts to get his money and as soon as Harry enters the mind-set of power imbalance returns. This shows Harry’s fear of being there—something which is then related to the mise-en-scène; the goblets sitting on high stools and low camera angles makes them look more intimidating. As the Goblins would have chosen the furniture themselves it says a lot about their defensive personality; “Goblins are not the most friendly of creatures” (Hagrid). This use of camera angles compensates for their small stature. This is the first time they are introduced. They might say also the perspective of just how the Goblins are acting is wrong. They might say that they are killing someone and no matter the reasoning, it is not justified. They might say it is not true that the life is extremely pitiful. If they would enjoy the rest of it as long as they can. They could also say that euthanasia causes devastation to the people around them, and they should let themselves die naturally. They might say that euthanasia devastates the patient’s family and might cause arguments amongst the victim’s family. The family of the patient might blame themselves because they didn’t kill their loved one. If there would be no life in the hospital and someone believed they could die, they could easily commit suicide— even though they are actually healthy. Allowing euthanasia could cause people to make regrettable decisions and feel as though they are wrong for anything; therefore they might have no reason to live for, therefore killing themselves for no reason.

Thirdly, a utilitarian might say that euthanasia can be justified, but only if it results in the largest amount of happiness possible. They might say that euthanasia can make the suffering person happy, as it ends their pain. But euthanasia can swiftly and allows them to take control of their illness— this results in a large amount of happiness from the patient. In contrast, euthanasia can cause a lot of grief and distress from the patient’s relatives, therefore it can make them feel bad. They might also say that euthanasia impacts the people around the patient in a negative way, as it removes them from their family and that they are finally at peace. They may point out that, in many cases of euthanasia, there is more pain caused than pleasure, which affects the overall happiness level. But euthanasia can be right, because the family and friends can appreciate that it was an important decision and that they were too much pain to continue living happily. If they truly loved these people, they would not make the suffering person happy, as it ends their pain, then they would be able to continue to strive for a better life.
The works of imagined that they brought civilisation to a land of primitive Europe, and the antiquarians often brought back valuable visits to famous Roman sites and monuments around of the old Roman empire during their studies - this involved culture, empire and architecture. It was a custom for young, admiration for ancient Roman civilisation and envied their the antiquarians interested in Roman Britain had a great Personal bias is an issue for any sort of recording of history, of Roman Britain: patriotism, an admiration of the Romans, In this essay I will be exploring these factors, which I believe bias, and some created simply from a yearning for wealth evidence as well – some as a result of this same influencing that would support their own pet theories. There was forged human error - sources in the eighteenth century were by eighteenth-century antiquarians was often inaccurate, of Roman Britain - this was the period in which Britain was part of the Roman Empire (from AD43 to AD404).

However, due to various influencing factors, the history of the ancient Roman involvement in Britain as documented by eighteenth-century antiquarians was often inaccurate, incomplete, or even completely fictitious – these were the “fictions, fakes and mistakes” in the recording of this history. Sometimes these inaccuracies were down to unavoidable human error – sources in the eighteenth century were often very difficult to understand, and there were plenty of misunderstandings and other. Inaccuracies were less innocent. Many of the antiquarians had very strong opinions about the history they studied, and these views could influence their interpretations of evidence or lead them to manipulate sources – painting a picture of history that would support their own pet theories. There was forged evidence as well – some as a result of this same influencing bias, and some created simply from a yearning for wealth and reputation.

In this essay I will be exploring these factors, which I believe most influenced the “fictions, fakes and mistakes” in the eighteenth-century antiquarians’ recording of the history of Roman Britain: patriotism, an admiration of the Romans, and the many unreliable sources.

Personal bias is an issue for any sort of recording of history, but it seemed particularly disruptive to the documentation of Roman Britain's history in the eighteenth century. Between the antiquarians of the eighteenth century, there were two conflicting opinions that could influence the way they interpreted and recorded history. At the time, most of these antiquarians were interested in ancient Roman civilisation and envisaged their culture, empire and architecture. It was a custom for young, wealthy scholars studying the era to go on a “Grand Tour” of the old Roman empire during their studies - this involved visits to famous Roman sites and monuments around Europe, and the antiquarians often brought back valuable sources – objects, facts, or even imaginary designs. When the Romans conquered Britain, the antiquarians imagined that they brought civilization to a land of primitive savages” – one eighteenth century antiquarian described the invasion as “the auspicious era of our happiness, when the bright rays of polite arts flew over the wing of Roman eagles”.[23] William Stukeley, in an unpublished book about ancient Julius Caesar, (1726, p.33). These antiquarians wanted to celebrate that Britain had once been a part of the Roman Empire which they so admired, and went to great lengths to do so, often making the histories they recorded inaccurate.

In the eighteenth century, a small, round Roman temple known as Arthur’s Oven was one of the best-preserved Roman structures in Britain, but some antiquarians were disappointed that it was not as grand as the ancient Roman architecture that they envied – Sir John Penicuik wrote in a letter to a friend, Roger Gale: “Nobody doubts of it being Roman, though a very plain piece of work”. Others, such as William Stukeley, (notably an author of many books administering extensive information about the small temple as a British equivalent of a Roman temple that was admired in the eighteenth century. “I imagine the reader is prepossessed into my own opinion that it may well pass for an imitation of the Pantheon or Rotunda at Rome” (Account of a Roman Temple, 1720, p.15).

Comparing the two temples, it can be seen that Arthur’s Oven is not particularly similar to the Roman Pantheon, and it becomes quite clear that these antiquarian’s admiration and high expectations of the Romans affected the way they tried to present this source.

Another influential example of the antiquarian’s admiration for Romans affecting their studies were the forged manuscripts of the De Situ Britannia (The Description of Britain). In the 1740s, antiquarian Charles Bertram produced a text, in which MacPherson composed stories of locations of ‘lost’ cities and towns in Roman Britain—supposedly written by a fourteenth-century English monk. Although by the late nineteenth century it had been completely discredited and said to be “plainly a clumsy forgery” by the head librarian of Windsor Library, it is easy to see why antiquarians were happy to believe it for so long. It gave more weight to the claim that in Roman Britain, and even showed that more of Britain had been conquered than previously known: a wonderful find for any antiquarian who admired the Romans. The text was very influential, and Bertram became famous – whether he created the forgery wishing to further boost the admiration for the Romans, or with a desire for riches and reputation in mind, he certainly understood what was influential and popular amongst the antiquarians of the time.

Clear was also some patriotism here on the part of the antiquarians that tampered with sources – they admired Rome, but soon wanted to find great Roman things in England. This is where James MacPherson came in. James MacPherson was a young Scotsman James MacPherson released volumes of poetry in 1763 and 1765 which he claimed to have found in the Scottish Highlands. The poems included tales of the war against the Romans, or with a desire for riches and reputation in mind, he certainly understood what was influential and popular amongst the antiquarians of the time.

The eighteenth-century antiquarian’s tendency to manipulate sources to fit with their own personal opinions that was not helped by the fact that many of the sources they used were often unreliable and difficult to understand and could lead them to make mistakes. Rosemary Sweet described problems with some early sources used by the antiquarians in her book Antiquaries: The Discovery of the Past in Eighteenth-century Britain (p.156): “As pride in British domestic and imperial achievements grew during the course of the century, the inherent tension between celebrating Roman dominion over Britain and establishing a genealogy of British liberty, independence and superiority, often meant that MacPherson was very interested in Highland culture and literature and was Scottish himself – perhaps it was patriotism, and a desire to show his country in a more positive light that led him to construct these forgeries.
Compare and Contrast the Use of Sound as Art in the Shozyg and Eargong to Identify and Evaluate the Musicality of Both Instruments in Hugh Davies’ Terms

Hugh Davies has done much to simultaneously clarify and blur the differences between sound art and music, writing of the ‘complementary links between music and the visual arts’ and going back to the earliest automata and through his electronic music research and documentation... [representing] electronic music for the first time as an apparently coherent, interdisciplinary, praxis.2 Davies created many categories into which all musicality should, theoretically, fit if it is to be classified as music, and not just unconnected sounds: what he called the proliferation of different names for what is basically the same kind of music.3 The purpose of this was to broaden common perception and acceptance of sound art. Davies applied his beliefs of what music was to some of the instruments which he made, to identify what is more musical or artistic out of multiple instruments, such as his ‘shozyg’ and eargong.

Both the shozyg and the eargong are unique, compared to more conventional instruments, because of their artistic properties. Where many instrument-purpose is to produce art in the form of music, both the shozyg and the eargong are partly art in themselves (a continuation of the experiments of John Cage and Harry Partch, who ‘used materials chosen for their sculptural as well as auditory qualities’).4 This seems so, firstly, because neither instrument’s sound product can actually be heard, without the aid of a solid medium through which the sound can travel. In the eargong’s case, this medium is two pieces of string tied around the top of the grill that forms the eargon. The user of the eargong tie both strings around their fingers and put them into their ears. This is mainly what makes the eargong so special, as it achieves what the shozyg does, without the need for any electronics, while maintaining an extremely simple and seemingly unsophisticated design.

The shozyg also works like the eargong in that one must use a special feature of the instrument to actually hear it, but the shozyg uses technology to achieve this – a multitude of contacts which are placed into it. The shozyg made up of a group of sound objects with the potential to produce sound, such as a spring or a fretsaw blade. A contact microphone is connected to each object in the shozyg, which is contained in a copy of the shozyg encyclopedias. One could argue that the shozyg is less expressive than the eargong and that being dependent on technology seems almost like cheating, as the sounds that are being produced by the shozyg are not real and genuine, but manifestations of a computer (Davies comments in Art and Sound, that in the use of electricity as a tool, technology became extremely diverse ranging from the simplest motor to fully computerised sound synthesis).5 rather than purely acoustic. However, the contact microphones are not nearly as absurd as many people might at first think. One could argue that despite being older than the eargong, the shozyg is for far more modern, due to its application of this technology.

One very notable difference between the two instruments is the shozyg’s ability to create a clear distinction between its own unique sound as opposed to another instrument such as a violin. It can play one sound, followed by another, and another to create music with a sense of variation. The ancient Roman piece of architecture, the eargong lacks this ability, as when playing with it, one will be restricted to the sound of someone kicking a grill, and no matter how one kicks it, the next sound will always be almost identical to the last. The shoezyg could perhaps instead define the musicality of an instrument by assessing its application to different forms of music. The shozyg can generate more notes where it matters, as well as rhythm; whereas the eargong can only produce rhythm, with utterly monotonous tonal content. This would suggest that the shozyg is more musical, because it has more musical potential, and its design creates more possibilities for the creation and performance of music than the eargong does, through containing a greater melodic diversity.

Others, however, might argue that the eargong is closer to a drum, or some other percussion instrument, than the shozyg. This is because the eargong is a more limited tool than a drum that can be used to play even more modern music than the shozyg. However, the eargong is simpler than other percussion instruments, and contains less that can make and vary its sound, and is therefore able to offer less potential to make music than the shozyg. The eargong can make clear patterns and rhythms with just the one general sound it can produce. The shozyg is obviously more productive and ‘musical’ tool to a beginner who tries in being able to do this – seemingly making sounds randomly – it would seem the shozyg can still do more in terms of making musical patterns and rhythms, but is able to produce some notes, or even just sounds with different pitch and timbre. Hugh Davies said that something can be more artistic or musical if it was purposely made to be so. In doing this, Davies suggested that an object’s artistic value is also partly dependent on the creator’s intention, as different people will identify different things as art. A musician, for example, may view a piece of art differently to a painter. Therefore, there is another way of comparing just how ‘musical’ two pieces of music or instruments are. If a person who couldn’t play any musical instrument wanted to play one ‘correctly’, they would have a much better chance in understanding an instrument for its simple way of generating sound. This is the same for the eargong and the shozyg. A complete beginner would be able to produce much more music with the eargong than the shozyg, because of its capabilities. The shozyg, on the other hand, offers, virtually maximising its musical potential. The same person might be unable to exploit all of the shozyg’s potential features, but could still once again, learn the same parts repeatedly, and therefore fail to see it as musically as they might the eargong. The eargong would likely be a far more productive and ‘musical’ tool to a beginner who tries both instruments for the first time.

For a person who is equally adept at both instruments, the eargong would likely be more useful, because a skilled player of the eargong may well play more complex music than an eargong beginner, but the difference would be less extreme, than for example, a beginner and expert in a shozyg beginner. The professional shozyg player may be more explorative than the the beginner, utilising every feature of the shozyg, opening many possibilities for creating more and different music, and so increasing its musical potential significantly. Therefore, it is likely that the shozyg would be much more suited in a professional performance, for example, where there is a need for creativity, or where the audience might be larger and more experienced. The eargong would be more suited to a gallery situation, where many, completely inexperienced and random people are simply experimenting for their own pleasure.

This is made even more apparent by the fact that it is in the eargong’s physical nature to be heard by no more than one person at a time. The eargong is not a very loud instrument. The eargong would therefore not do very well as the tool of a performer. The audio of the shozyg, being dependent on technology, may have the opportunity to diffuse to a larger audience through means such as loud speakers. The one-person hearing system of the eargong may therefore seem a disadvantage, but in a gallery, it will play as useful. Here, the eargong could sit amongst many other artworks which are being looked at by many different people, who might be distracted and annoyed if they could hear the product of someone else’s use of the eargong.

Art galleries are generally for the experiencing of existing visual artworks, whereas music or instruments are often other performance are for the active creation of art. This would suggest that the shozyg is more suited as a tool for creating music, rather than being looked at and played with by the public. One could say that this means that the shozyg is the more creative instrument out of the two, and also, once again, the most versatile as, with the aid of technology, it too can be heard only by its player, if they use headphones.

The shozyg is capable of producing much clearer and more varied sounds than the eargong, because of the different materials it can interact with to create sound. However, if a skilled player of the shozyg is interested in more than simply making music for its own sake, they need to limit themselves to only using the materials that are normally thought of as ‘conventional’ instruments. It is abstract, certainly unconventional and can only maybe of the shozyg’s potential, because of Davies’ definition of what produces sound and/or music. However, its unconventionality brings a certain freedom to it. It will make sounds, or ‘sounds sonore’ as Pierre Schaeffer would have called these unidentifiable sounds, into an abstract artwork or a piece of organised music, by using each sound in its own way.
Early 20th-Century Avant-Garde Poetry

Yr 9, Key Stage 3

M. Culley, Heartland High School, London
Supervised by E. Heinz, Birbeck College, University of London

During the early Twentieth Century there was an explosion of innovation in writing and art that contradicted the traditional style used repeatedly prior to this movement. Within this large movement there were many smaller groups that had their own values and beliefs that generally opposed each other, for example the Italian Futurists (led by F.T. Marinetti) were much more in favour of shocking people and taking inspiration from the fast changing development of technology that drew them away from poetic tradition which they believed should be destroyed. This contradicted with the views of the Imagistes led by Ezra Pound who became so called experts on traditional poetry before they wrote their modernist pieces. Another equally important Imagiste, T.S.Eliot, wrote a quote that gave the perspective of many of these upstart groups, stating that: ‘Novelty is better than repetition’.

The Italian Futurists would agree with this quote and support it to a more extreme extent than others because they themselves believed that literary tradition (which they viewed as repetition) should be destroyed.2 This shows that to the Futurists, tradition could be seen as repetitive and very similar to other literature which was not of the Futurist style and therefore would have upset them as it contradicted many of the things they wrote in their manifestos. They would also interpret the ‘Novelty’ part of the quote as new work tailored to shock and create change as again this supports the manifestos of this group. To sum up, the Futurists didn’t value poetic tradition as they felt it limited their work because they followed the rules, repeating traditional literature. They did value poetic innovation as it allowed them to use their so called ‘words in freedom’ and convey the changing technology in the world around them as well as destroy other innovative techniques that weren’t as radical as the free verse which was used by Imagistes such as Ezra Pound.3

Unlike the Imagistes, the Italian Futurists valued traditional work very little and wanted to burn all the libraries and museums as they were places that preserved tradition that they felt restricted them. Therefore they took inspiration only from the rapidly changing world around them and created words in freedom as for them free verse was not modem enough any more. Words in freedom threw away any grammatical rules away and was tailored to shock audiences and critics alike, the work looked nothing like poems at all and was not made to please but almost to shock or change it. The Imagistes similarly, used a very strong boundary-shaping style that caused audiences to feel extremely strong emotions almost instantly.

An example of their words in freedom style is a poem by F.T.Marinetti called Bombardment, which is based on a battle Marinetti reported on4 and takes on an almost incomprehensible shape that has completely distorted words. For example, the word ‘vibrate’ is used multiple times in an almost onomatopoetic way via the repeated use of the letter ‘r’ in each one. This is an example of what Marinetti called words in freedom which allowed words to do what they want and in this case they are chaotic in their form to convey a battle with machines which was a topic the futurists favoured and took inspiration from due to the fact that it was changing constantly, particularly at the time of the movement. This piece, whilst chaotic, is clearly carefully written as it contains what looks like calligraphy with the balloon in the middle and the word ‘vibrate’ forming radio signals. The point of this piece being so dramatic (despite that it was written in 1916) is how the irony of each facet being ‘plain’ and shock audiences which was one of the main motives of Futurist poetry.

In comparison to the Italian Futurists, the Imagistes valued traditional work as much as their modern work because they still used older techniques mixed with free verse to make it a novelty. This allowed them to be experts on poetry and value the past and still create beautiful work. Contemporary critics viewed art and literature as things that should be pleasing, putting them behind the Imagistes who created work that was pleasing whilst still pushing boundaries.5

In contrast, the Imagists may not agree because firstly they themselves believed that they should know as much as possible about traditional poetry and poets, they wanted to become ‘experts’ on poetry before creating their ‘Novelty’ work. This indicates that they would regard this quote as opposing their methods as it seems to belittle the past as repetitive. They themselves see both traditional and innovative techniques that should be pleasing, putting them behind the Imagistes who created work that was pleasing whilst still pushing boundaries.6

An example of this new re–sculpturing of a repeated technique is Ezra Pound’s In A Station of the Metro.7 The poem itself is made up of one metaphor split into separate words. The poet carefully chose his own technique that was presenting a stanza in an odd way but it retains its Imagiste style through the use of a language device (metaphor). This mix of novelty and repetition clearly presents the Imagiste’s favoured balance of the two. The metaphor within the poem compares ‘the apparition’ of faces in a crowd to petals on the bough of a tree. This can be seen to say that the faces are individual and unique to its own context as a petal. The faces are also more significant and brighter against a dark almost dirty object. This could be an extended metaphor for a train station, which the title suggests, and how humanity’s creations are large and dark whilst the humans are beautiful. This shows a contrasting message to that of the Italian Futurists as it challenges the changing modernist society and its fast changing inspiration from this. Displays a possible conflict between the two parties who argued over whether tradition or innovation was the correct style to move in. The poem which was at a turning point with newer generations finding less value in writing poetry filled with emotion and lacking originality in structure and sometimes even content.

Another modernist was John Rodker who didn’t identify as a member of these contrasting groups but saw poetry as way of coming outside of world he knew as the ‘vaid’.8 He was born lower class and that didn’t enable him to read much older poetry and he himself said he liked poetry that was made up of one typical technique and that they must study the old to create the new. This suggests that they repeat the use of one typical technique and from the rapidly changing world around them as well as destroy other innovative techniques that weren’t as radical as the free verse that shocked people more so than Rodker’s free verse which shows a shock similarly between his poems, however shocking and odd with their typographic, were completely separate to that of the Italian Futurists.

Unlike the Imagistes, John Rodker wasn’t highly educated and thus new little of poetic tradition and probably didn’t value it as an important part of helping to craft his work. However he did value free verse similarly to Imagistes which he used when creating his work as you can see in item. This use of free verse shows that like the Imagistes he valued innovation and the idea that Rodker enjoyed to shock himself and others. His poems, however shocking and odd with their typography, were completely separate to that of the Italian Futurists.
Another way to look at how these groups valued old versus new, or tradition versus innovation, is through the main purpose of their works. In John Rodker’s case, he wrote poetry to establish contact with previously unapproachable ideas and that they were made to shock, demonstrating that he was completely focused on innovation as traditional work was made to seem beautiful like a work of art but modern work is genuinely made to change and shock, to create change via strong reaction. With the Imagists (particularly Ezra Pound) they wanted to rid poetry of emotion but not the actual element of poetry itself thus splitting equally the ratio of innovation and tradition, placing them in the middle as they intended to use both to create work ‘free from emotional slither’.

Finally, the Italian Futurists wanted not just to spark not through upsetting their audiences but also to destroy buildings like museums that celebrated the past and ignored the contemporary revolution in machinery, as well as those who worked to preserve the past like archaeologists, therefore showing that they didn’t value tradition and saw it as an enemy to their shocking words in freedom style and valued innovation completely as it captured exactly what their art and literature was.

In conclusion, it is clear that during the early Twentieth Century, the avant garde groups that led this revolution in culture not only fought the critics, and sometimes tradition, but also each other with their contrasting views on new art and literature. This sparked a new culture that changed culture as the First World War changed societies and warfare globally. These groups have had a lasting effect on poetry that we see today. Poetry has changed so much since 1910 that one of the 1900s most influential figures regarding change within literature particularly. Lastly, despite the other profound changes that took place during the Twentieth Century, I ask you to think about how much we value innovation today.

Throughout this course, a range of texts which both support and contradict this statement have been explored. The ones being considered in this particular essay will be Christine de Pizan’s ‘The City of Ladies’ and two versions of ‘Lanval’. In the latter instance, both Marie de France’s and Thomas Chesters will be considered. In reference to the work of medieval women, it could be argued that men should write about men and women should write about women. This is due to the misogynistic views that society possessed in the medieval era. Men would often slander women through their writing to display them as inferior members of society, which would make it unfair as people would only see men’s side of things.

In Christine de Pizan’s ‘The City of Ladies’, she creates the character of Lady Reason who ‘keeps the world from falling in a man of rational thoughts. On the other hand, the character of Christine juxtaposes with that of Lady Reason because she is highly influenced by the documentations she reads. She sets out to learn from her own women and only been exposed to male views and because of this women find it hard to differ between the truth and lies made by men.

Christine de Pizan emphasizes to her readers the volume of texts which are tainted, “many books of different kinds”. As we learn later in the extract, all of the books she has read are, it seems, primarily written to ‘slander’ women. Therefore, the fact that a book is written by a woman which values women’s rights and demonstrates how misogynistic views were widely shared and presented by writers who all “speak with one voice”, specifically of men’s failures. This demonstrates the writers have the same view on women. None of the accusations or ideas about women has ever been proven wrong, because all writers are men and no females felt able to challenge their views. However, it is said that philosophers are “constantly correcting each other’s opinion” meaning that just because they all share opinions and add on to each other’s ideas of how the world works, it doesn’t mean it’s right. Describing the philosopher’s opinions as a mistake, implies that it is a mistake for men to speak badly of women and portray them in a bad light and it is something that needs to be corrected. Therefore, Christine says that writers write “such awful, damning things about women and their ways”. Talking about writers collectively, really emphasizes how it is not just one book written by a man that slanders women, but the majority. This shows the scale and severity of the issue at hand and how important it is for women to do something about it now before the issues escalate.

The book of ‘The City of Ladies’ mainly explores the idea that a person should make judgments and decisions based solely on personal knowledge; however, Lady Reason attempts to help Christine come to her senses “out of pity”, which could suggest that, as a reassured woman, she is tired of seeing young vulnerable and naïve women suppressed by the patriarchal views of male writers. Texts written by men are described as “a pack of outrageous lies” and it is Christine’s naivety which has led to her taking “what they come out with as the truth” means that Christine has not yet experienced fully the harsh remarks made about women and she is inexperienced in interacting with others. Due to this she has become completely dependent on what she reads in books, meaning she has only had the views of misogynistic philosophers on which to base judgments. Christine is not using her personal interactions with other women as evidence to prove that the men writing are lies. She tells Christine that the “misconceptions” have “clouded” her mind. Which suggests that through writing, male figures in society are almost brainwashing young people to think as they do, and training the younger generation to fit into society by carrying on the tradition of slandering women. Christine de Pizan shows that in order for people to be exposed to an accurate representation of women, women need to stand up and rebel against the male writers who are falsely portraying them. Men will never write honestly about women because they do not want to seem feminine or be seen to portray them honestly, as opposed to having a hidden agenda. Christine has emphasized how much she values tradition and we cannot be completely sure of this. On the other hand, men of the time had lives they enjoyed. They did not want women to become educated enough to challenge their society. In contrast, reading a piece written purely to make a specific gender seem more superior to the opposite sex. However, both pieces explore the idea that men, in particular, address minor, trivial issues within society that do not really matter and will not better society or life as a whole, but instead reinforce men’s superior role.

In conclusion, it is apparent from the evidence that has been presented, that men should write about men as they have experience as men in society. However, it is also apparent that women are able to write about men as they are more likely to give character and explore male character. Therefore, men seem to portray women as inferior because they do not want women to be powerful enough to make their husband’s life such a disaster that they would not write about women, or should not. But in modern literature, we can see women’s literature as they should be. We see works that are not just to spark riot through upsetting their audiences but also to destroy buildings like museums that celebrated the past and ignored the contemporary revolution in machinery, as well as those who worked to preserve the past like archaeologists, therefore showing that they didn’t value tradition and saw it as an enemy to their shocking words in freedom style and valued innovation completely as it captured exactly what their art and literature was.

The philosopher’s opinions as a mistake, implies that it is a mistake for men to speak badly of women and portray them in a bad light and it is something that needs to be corrected. Therefore, Christine says that writers write “such awful, damning things about women and their ways”. Talking about writers collectively, really emphasizes how it is not just one book written by a man that slanders women, but the majority. This shows the scale and severity of the issue at hand and how important it is for women to do something about it now before the issues escalate. Additionally, the character of Lady Reason who is a strong-minded woman and literature. This sparked conflict that changed culture, not only fought the critics, and sometimes tradition, but also to destroy buildings like museums that celebrated the past and ignored the contemporary revolution in machinery, as well as those who worked to preserve the past like archaeologists, therefore showing that they didn’t value tradition and saw it as an enemy to their shocking words in freedom style and valued innovation completely as it captured exactly what their art and literature was.

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How Did Reading Shape Society and the Lives of Individuals in the 18th Century?

**Year 10, Key Stage 4**

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This essay will examine the ways that reading shaped society and the lives of individuals by helping to develop national and individual identities in the eighteenth century. It will examine the ways that reading helped to spread power throughout society by referring to the ideas of the philosopher, John Locke (1632–1704) put forward the idea of "identity" that labels us, we are all varied in nature and this contributed to the self or distinction the world sees. This allows us to infer that we build specific topics up into a pool of ideas, which we appear to repeat repeatedly and which it is made.

This happens everywhere like billboards, advertisements, social media, signs, etc. Things that are widely available influence the way we think, the way we interpret the world, and how we act. The information we read, which is everywhere, subliminally dictates the way we are and what we believe in or agree with. An example of how reading influences your identity is newspapers you read, which usually reflect a particular political view and so can reinforce your judgments and political prejudices.

The first newspapers emerged in the early years of the eighteenth century and this essay will focus particularly on the role of newspapers in the development of patriotic songs and a canon of British poets, and it will show how these changes influenced the lives of individuals.

The Meaning of ‘Identity’

First of all what is the meaning of ‘identity’? This single noun causes controversy; the reason for this is the tension within its definition, which has to come to learn is ‘a close similarity or affinity’.

The Latin origin ‘identem’ means same, however, in the sentence we live in today, it has acquired multiple meanings such as ‘traits defining who or what a person or thing is’ or “the fact of being who or what a person or thing is”. These definitions often reflect the notion of individualism in modern societies. The idea of having a sense of identity, especially, which is predominant in adolescents’ lives, has a major impact on the way we think in the early stages of life and how the adult mind develops. This social media thing is so subtle advertising on social media telling them what to buy and how to improve their lives and they are subject to peer pressure, people are shaped by the mass media, and this is a sign of idea, which we appear to repeat repeatedly.

It is also important to remember that whilst we remain within ourselves differentiate we from the essence of others. It is also important to remember that whilst we remain the same in many respects we nevertheless change and develop throughout our lifetimes. We have come to learn that our features and attributes contribute to the identity that labels us, we are all varied in nature and this contributed to the self and the distinction the world sees.

What could have influenced this change of definition? The philosopher, John Locke (1632–1704) put forward the idea that people who are born the same since we are born with minds without any ideas’ and he asks them to think about how it comes ‘to be furnished’.

This lack of foundation for who we are is extremely significant. The eighteenth century had social factors that make us different. This shows us how the definitions of this distinct word clash. Whilst the notion of identity has remained the same, the meaning and interpretation of the word have changed. It is also important to remember that whilst we remain the same in many respects we nevertheless change and develop throughout our lifetimes. We have come to learn that our features and attributes contribute to the identity that labels us, we are all varied in nature and this contributed to the self and the distinction the world sees.

The Times, 1788, shape your political views, ‘gossip’ papers like The Sun, which promote false imagery of the human body and nature, makes us think certain ideas are normal and to be desired despite being unrealistic. In addition, social media especially, which is predominant in adolescents’ lives, has a major impact on the way we think in the early stages of life and how the adult mind develops. This social media thing is so subtle advertising on social media telling them what to buy and how to improve their lives and they are subject to peer pressure, people are shaped by the mass media, and this is a sign of idea, which we appear to repeat repeatedly.

The public sphere is an important part of society, and we can learn about the role of newspapers and the role of the public sphere in shaping society and the lives of individuals in the eighteenth century. This is best demonstrated by the role of newspapers in shaping society and the lives of individuals in the eighteenth century.

The content of this section will be an argument in which I will draw upon the ideas of German socialist Jürgen Habermas, articulated in his book *The Structural Transformation of the Public Sphere*.

The structural transformation of the public sphere, to show how coffee houses created centres of conference which brought about a shift of social and economic power from the authorship to the courts of groups of individuals in the late 18th and early 19th Centuries.

There are various things that can impact who we turn out to be in everyday life and this essay will focus particularly on reading. Throughout our lives we are bombarded with information which we look at and comprehend the meaning of by interpreting the language or images of }
that men were exceptional writers with higher intellects than women since they were situated on a podium above all who did not fit in the same criteria as them.

Literature today is also used to characterise a sense of national identity. We have proclaimed certain authors to be ‘ours’, as if we own their works, for instance, Charlotte Bronte, Chaucer, Bouicaut, Jane Austen, etc. in the society we live in today students are made to study a “range of classic literature fluently”, making sure all children ‘develop the habit of reading widely and often’. [1] These values and judgements were amass what the philosopher Pierre Bourdieu has called ‘cultural capital’, this means that he had to appear in his possession of the event with being a gentleman. These values and judgements were disseminated through journals such as the Gentleman’s Magazine, the Monthly Review and the Critical Review.

Literature was valued throughout the 18th Century and one of the many men who promoted reading was Lord Chesterfield. In his letters to his son, he recommends books to him stating that “the principal object of your stay there, is the knowledge of books and sciences; which if you do not, by attention and application discover, how is it possible, while you are there, will you be ignorant of them all the rest of your life; and, take my word for it, a life of ignorance is one of the very contemptible, but a very tiresome one. By Chesterfield stressing the importance of books in life we can see that literature was fundamentally a key part of the basis of life, it without it was boring and worthless. In addition, Wordsworth, when discussing what we would need to read, that “reading is that means or method of knowledge whereby we acquaint ourselves with what other men have written or published to the world in their investigations of the state of the human spirit. It is an advantage; for by them we are made partakers of the sentiments, observations, reasonings and improvements of all the learned world, in the most remote nations, and in former ages, almost from the beginning of mankind.” [2] We live in, such as Chimamanda Ngozi Adichie, Benjamin Zephaniah, Anita Desai and others. Today we recognise a much broader range of talented writers in our country which reflects the values we aspire to as a nation.

Today, just as in the 18th Century, literature has become a basis for the way the nation sees itself and projects its values and ambitions. The culture of reading and the display of books and displayed on our screens help to create an image for the country and therefore a canon did indeed shape help shape the country and its individual identity.

Individual Readers: James Lackington and Thomas Spence

It was not only national identity but also individual identity that was shaped by reading in the 18th Century. People read for entertainment, to communicate and, most importantly, to gain knowledge. This could influence the way people developed, depicting ideas of morality and a sense of good and bad. This suggests that reading, in terms of impacting people’s lives, was clearly of great importance.

James Lackington’s life is a great example to show how literature was used to forge a new identity as he completely redefined and revered his identity as a reader to do so. He was born into a poor family in rural Somerset in the middle of the 18th Century but after learning to read he became the owner of one of the biggest booksellers in London, the Temple of the Muses. He identified himself as a ‘Gentleman’ by the end of his life and had the wealth, the house and accessories to support this claim. He recognised it was not enough to be wealthy if you wanted to be acknowledged as a ‘Gentleman’ and a successful person; you needed to be able to talk about the things that people with power valued and that meant literature. In each of Lackington’s books, he placed a list of books, offering others to follow his example. His autobiographies offer a persuasive account of the power of reading to transform a life! [3] Although he stated that reading could transform people’s perceived levels of books to make him feel and look powerful. Lackington had to mass what the philosopher Pierre Bourdieu has called ‘cultural capital’, this means that he had to appear in possession of this sentiment with being a gentleman. These values and judgements were present in the 18th Century;

In conclusion, I have found that reading and literature were very influential in the 18th Century; they helped develop national and individual identity, created the public sphere and extended power in Britain to the citizens, they also became a way in which the nation saw itself and projected its values and aspirations. In addition, some of my findings were shocking, for instance, the fact that there was segregation between genders in terms of admitting power and acceptance of work into famously acknowledged literary canons of the 18th Century. To summarise, reading did shape society and the lives of individuals in the 18th Century.

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I'm very grateful to S. McDonald for all her support during the term.

In Art: Banksy and Kara Walker

Throughout the 20th century, art was constantly being re-invented. Art became a means to address politics and revolution, and many artists at this time adapted to portray issues in society. Through artists like Manetti and his ‘Manifesto of Futurism’ which started to challenge by the image which captured uprising, revolution and energy, to the Dada movement attacking the German government and liberating its people, art came a long way. But now, in the 21st century, as a means for depicting contexts, for summarising, it will be argued that while British street grafitti artist Banksy and African American contemporary artist Kara Walker (both 21st century artists) may not have changed the world through their work, they have both re-introduced the idea of political art into the mainstream, in a way that has not been apparent for some time. In their use of the popular and instantly familiar, they address social issues and critique stereotypes in a way that easily connects to the people – rather than to a purely elitist audience. I have chosen the works of Banksy and Walker both depicting attitudes towards racism, segregation and equality, but in very different forms and mediums.

Banksy’s unrulid mural, featuring five grey pigeons and a migratory bird, was painted onto a wall in Clacton-on-Sea in 2014. This artwork appeared a week before a UKIP by-election that was dominantly argued on immigration. The pigeons hold up signs like ‘Migrants not welcome’, ‘Back to Africa and keep off our worms’ towards the more colourful, supposedly foreign bird. It clearly depicts the problems surrounding immigration. UKIP continues to argue that current government controls on immigration are insufficient, and recently revealed their own plans to create a Migration Control Commission to bring down net immigration. This would increase border staff by 2,500 and define rules to kick immigrants and non-EU citizens (Oakden, 2017). Banksy seems to be reflecting on this increased attention towards immigration, using birds as a metaphor for social argument.

Banksy, mural on a beachfront wall, Clacton-on-Sea, 2014.
Not too long after his mural was painted, it received a campaign to ‘blur it could be seen as offensive and racist’ and was taken down. (Johnston, 2014) Yet, as with many articles that tackle such complex and profound subjects, it is astonishing that people as cretinous as you have the for it. The public lashed out, with responses such as, ‘It is astonishing that people as cretinous as you have the

## Banksy

Banksy’s mural was controversial and taken down very early, in severe, stereotypical forms. The imagery is designed to have immediate impact, the posture of the figures quickly showing their subjugation, and the effect is startling. It demands an emotional response, but a complex one, with social and cultural implications that are encouraged to think about today. Have our attitudes changed? Are we, or at least some of us, as politically and socially aware today as we were in the past and the present, this is a clever means of urging debate.

Banksy’s objective with his mural is to display the current problems of immigration in a light-hearted and understandable way. As all people will understand the problems of immigration, even young and inexperienced, Banksy seems to know that there is a chance these people will understand the migration of birds, specifically the migratory birds. Byimg down the idea of immigration of a flock of birds flying across the world, we can at the mural and think of immigration as a basic process instead of an antagonistic and without anyone seeing him to avoid getting caught. This is a very thoughtful approach to certain things. Another interesting thing is the change in pigeons to go somewhere else. This is very similar to Walker’s choice of visual interpretation is much less

## Kara Walker

Kara Walker’s artwork is called “My Complement, My Enemy, My Oppressor, My Love”. Kara Walker’s choice of visual interpretation is much less

Kara Walker’s story is much less clear than Banksy’s, although we can look at the visual content. The focal point is a man getting thrown carelessly onto the ground, representing the unrelenting punishment on the slaves and the consequences that this causes. Other powerful images in the artwork include a man getting thrown carelessly onto the ground, representing the unrelenting punishment on the slaves and the consequences that this causes. Other powerful images in the artwork include a man getting thrown carelessly onto the ground, representing the unrelenting punishment on the slaves and the consequences that this causes. Other powerful images in the artwork include a man getting thrown carelessly onto the ground, representing the unrelenting punishment on the slaves and the consequences that this causes. Other powerful images in the artwork include a man getting thrown carelessly onto the ground, representing the unrelenting punishment on the slaves and the consequences that this causes. Other powerful images in the artwork include a man getting thrown carelessly onto the ground, representing the unrelenting punishment on the slaves and the consequences that this causes. Other powerful images in the artwork include a man getting thrown carelessly onto the ground, representing the unrelenting punishment on the slaves and the consequences that this causes. Other powerful images in the artwork include a man getting thrown carelessly onto the ground, representing the unrelenting punishment on the slaves and the consequences that this causes.
Friend or Foe? European Relations with South Africa During the Period of Apartheid 1948–1994

L. Fuchs, Weston Favelly Academy, Northampton. Supervised by H. Crosfield, Royal Holloway, University of London

Apartheid is a Dutch term used to describe separateness. Specifically, this term is commonly applied to racial segregation in the former Union of South Africa depending on their ‘race’. A race is a social construct that was created in the 16th Century and implies that skin colour affects people’s worth or characteristics. This idea was further developed during the reign of European empires and, specifically in South Africa, by the British Empire.

The white colonists’ approach of exploiting an ‘indigenous’ civilisation and their ideas about how race affected individual worth mirrored Columbus’ original exploitation of Native Americans. The British colonist Cecil Rhodes famously said ‘we must treat natives where they are in a state of barbarism to a different way of ourselves. We are to be lords over them’. This statement is not only easily compared to the colonisers’ belief of the superiority of white people, but also reflective of Apartheid’s policies than Henrik Verwoerd’s description of Apartheid as a ‘policy of good neighbourliness’. Verwoerd tried to excuse the inexcusable by declaring the policy as ‘misunderstood’. The similarities between Aryan teachings and Apartheid policies is astonishing considering how little opposition was raised to begin with. It took until the 1960s for the South African Action’s (BOA)'s insipid goals' actions to fully widen our morality to respond to discrimination in a post-colonial context.

The South African Apartheid occurred between 1948 and 1994 under the National Party, although its antecedents can be found in the 19th Century. It was the separation of the non-white (mainly black) from the white South Africans. The origins of Apartheid can be traced back to 1884 when South Africa was partitioned into Cape Colony, Natal, Transvaal, and Orange Free State. The Prime Minister of the Cape Colony at the time, Cecil Rhodes, stated that ‘the black man is fit for nothing but the plough’. His statement is a direct reference to the racial ideology of Apartheid. However, this is not the only reference to the ideology of Apartheid; there were many more. The term 'Apartheid' comes from the Afrikaans word 'apartheid', which means 'separation'.

In terms of diplomacy, foes of Apartheid could try to exert influence on the situation. For example, UK Prime Minister Margaret Thatcher tried to influence the situation without formal engagement. This was known as ‘constructive engagement’, which was a policy of macro interventionism in South Africa’s economy. Thatcher and Ronald Reagan, was known as constructive engagement, which was a policy of macro interventionism in South Africa’s economy. Thatcher and Ronald Reagan, was known as constructive engagement, which was a policy of macro interventionism in South Africa’s economy. Thatcher and Ronald Reagan, was known as constructive engagement, which was a policy of macro interventionism in South Africa’s economy. Thatcher and Ronald Reagan, was known as constructive engagement, which was a policy of macro interventionism in South Africa’s economy.

Margaret Thatcher said at the commonwealth in 1987 that the ANC was a ‘terroristic organisation’, which shows how influential she was in her own right. However, the South African government even though she negotiated for Nelson Mandela's release from prison (Richard Dawdson 2002). This was a point of contention between Apartheid and the international community. The South African government was reluctant to engage with the international community out of fear of losing their support (Alex Thompson 2005). The West didn’t want South Africa to fall to communism, and the US was the biggest supporter and acted accordingly. The US companies also paid lots of taxes in South Africa, which really increased the wages of the whites and didn’t benefit the black workers very much. Constructive engagement positioned supporting capitalism, in a similar way to the Truman doctrine, by providing aid to those in their region that may otherwise support communism out of desperation. However, because of the principles of capitalism, the people in charge were unlikely to give the extra money to the suffering black workers and more likely to keep it for themselves.

But in either case the result was the oppression of the black population. An anti-Apartheid group would need to discourage immigration to South Africa as each immigrant would make the country and the Apartheid regime more powerful. The anti-Apartheid campaign included sensible arguments for and against emigration to South Africa (Karel Roskam, 1975), to help inform the population and help them make educated choices. Some of the leaflets also played along with stereotypes of black violence in order to frighten people away. The campaign was a combination of threats and logical debate that sought to provoke a response from South African migrant organisations in Holland and tourist bureaus as well as repelling the potential migrant. There were also numerous boycotts across Europe, including the BOA and the EFO (Peter Lang 2010) boycotts, as well as the publicity of the Insipid goals and the Rivonia Trial.

The social impacts of Apartheid affected both the white and ‘non-white’ population. Not only did the ‘non-white’ population suffer constant abuse and reminders of their inferiority, the white population often felt themselves to be more important than their ‘non-white’ fellow human beings. Outside influence was needed to shake this illusion, show support and increase morale amongst those suffering under Apartheid’s policies. The main source of support, both moral and financial, to Apartheid’s isolation was Europe. One important way this happened is through the black South Africans who sought refuge in Europe. Britain was the main source of support for the South Africans who were fleeing the violence and who wanted to be part of a European country. However, the UK was reluctant to engage with the international community out of fear of losing their support (Alex Thompson 2005). The West didn’t want South Africa to fall to communism, and the US was the biggest supporter and acted accordingly. The US companies also paid lots of taxes in South Africa, which really increased the wages of the whites and didn’t benefit the black workers very much. Constructive engagement positioned supporting capitalism, in a similar way to the Truman doctrine, by providing aid to those in their region that may otherwise support communism out of desperation. However, because of the principles of capitalism, the people in charge were unlikely to give the extra money to the suffering black workers and more likely to keep it for themselves.

The anti-Apartheid movement worldwide formed a network of organisations across Europe that made the abolition of Apartheid their main concern. It also aimed to be a ‘non-partisan’ organisation, meaning that it would appeal to people of varied political ideologies united for the future of South Africa. However, the anti-Apartheid movement was not a single organisation, because the anti-Apartheid movement was a collection of varied political ideals united for the future of South Africa, Britain amongst them (Gavin Brown, 2013). In fact, Britain, with Thatcher adhesion to constructive engagement, was the highest investor in South Africa ‘in 1985, with £25 billion of foreign investment’ (Helen Yaffe, 2013). The movement in Britain didn’t influence the government enough to change its standing until much later on.

Many people failed to make the connection between racism abroad and racism at home. However, the BOA, for example, saw themselves as being white South Africans, but also at home where less attention was drawn to them. One might expect that after fighting against the genocide of the Jews by the Nazis, such racial discrimination as was experienced by the Jews in South Africa was not to be accepted in Europe. However, it did, partly because enlightenment ideals hadn’t yet spread to include non-white groups and partly because of the tensions that were arising between the USA and USSR as each envisioned a different future for the world and embodied completely opposite ideologies. The rise and fall of the tension between the two superpowers is known as the cold war, and was the main reason for the South African government for fear of losing their support (Alex Thompson 2005). The West didn’t want South Africa to fall to communism, and the US was the biggest supporter and acted accordingly. The US companies also paid lots of taxes in South Africa, which really increased the wages of the whites and didn’t benefit the black workers very much. Constructive engagement positioned supporting capitalism, in a similar way to the Truman doctrine, by providing aid to those in their region that may otherwise support communism out of desperation. However, because of the principles of capitalism, the people in charge were unlikely to give the extra money to the suffering black workers and more likely to keep it for themselves.

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paid for the police, weapons and prisons that maintained the Apartheid system (Parsons, 1985). They were scared that if the PAC or ANC rose to power, South Africa would become another communist satellite state. The Soviet Union already controlled some very mineral-rich countries, and South Africa had large amounts of metals, coal, platinum, diamonds and gold. The West didn’t want these resources to fall into Soviet hands. The extent to which the situation was affected by fear of the spread of communism was shown in the Rivonia trial, where one of the accusations leveled at the ANC was “acting in (destructive ways) to further the objects of communism”. This was perhaps one of the issues that made the ANC’s growing popularity so concerning, and the support of them difficult, for many European governments. When the Soviet Union began to fall in 1989 there was no longer such a strong incentive to support the regime. The change in relations of that point showed how significant the threat of communism was in influencing the West’s approach to Apartheid.

Early Twentieth Century Avant-Garde Poetry

Year 10, Key Stage 4

L. Tregenza, Mounts Bay Academy, Penzance
Supervised by D. McFarlane, University of Exeter

During the early twentieth century there was an explosion of innovation in writing and art that contradicted the traditional style used repeatedly prior to this movement. Within the avant-garde movement there were many smaller groups that had their own values and beliefs on topics that generally opposed each other. For example, the Italian Futurists and T.Marinetti were more in favour of shocking people. They took inspiration from the fast-changing development of technology that drew them away from poetic tradition, which they believed should be destroyed. This was perhaps one of the reasons why the views of the Imagistes (led by Ezra Pound) who became so called ‘experts’ on traditional poetry before they wrote their modernist pieces. Another equally important Imagiste, T.S.Eliot, wrote a quote that gave the perspective of many of these upstart groups, the quote stating that ‘Novelty is better than repetition’.

The Italian Futurists would have agreed with this quote and supported it to a more extreme extent than others because they believed that literary tradition (which can be represented via the word ‘repetition’) should be destroyed. This shows that to the Futurists, tradition could be seen as repetitive and very similar to other literature which was not the case with other movements. It would therefore have upset them as it contradicted many of the things they wrote in their manifestos. They would also have interpreted the ‘novelty’ part of the quote as ‘try new things, do not create change, as again this supports the very strong manifesto of this group. To sum this up, the Futurists didn’t value poetic tradition as they felt it limited their work because it followed years and years of grammatical rules which is also a feature of traditional literature. They did value poetic innovation, as it allowed them to use the so-called ‘words in freedom’ method. This conveyed the changing technology in the world around them, as well as destroying other innovative techniques that weren’t as radical as words in freedom, such as free verse which was used by Imagistes such as Ezra Pound.

However, unlike the Imagistes the Italian Futurists valued traditional work very little, They wanted to burn all the libraries and museums as they were places that preserved tradition which they viewed as restrictive. They therefore took inspiration only from the rapidly changing world around them, and created words in freedom as for them free verse was no longer modern enough. Words in freedom were found in anything they did not like; they tailored to shock audiences and critics alike, the work looked nothing like poems at all and was not made to please but almost to shock and amuse the reader. They believed that the work was its clear boundary pushing style which caused audiences to feel extremely strong emotions almost instantly.

An example of their words in freedom style is a poem made by F.T.Marinetti. The poem is called Bombardment. Based on Marinetti’s report that stated the ‘novelty’ in poetry, the text contains incoherent shapes that has completely distorted words. For example the word “vibrate” is used multiple times in an almost anonomatopoeic way via the repeated use of the letter “r” in each one. This is an example of what Marinetti called words in freedom which allowed words to do what they want. In this case the words are chaotic in their form in order to convey a battle with machinery which was a topic the Futurists favoured, and took inspiration from, due to the fact that it was changing constantly, particularly at the time of the movement. This piece, however, is clearly carefully written. It has forms of what looks like calligraphy, with the balloon in the middle and radio signals as the words vibrate. The poem itself is made up of one metaphor split into separate words. The poem is clearly free verse (a modern technique that involves presenting a stanza in an odd way) but it retains its literary value by using a language device (metaphor). This mix of novelty and repetition clearly presents the Imagiste’s favoured balance of the two. The metaphor with the poem compares ‘the apportion’.
faces in a crowd, to petals on the bough of a tree. This can be seen to say that each face is different and has its own colours and shape, just like a petal. The faces are also made more significant and brighter against a dark and almost dirty object. This could be an extended metaphor for a train station, which the title suggests also suggests, and how humanity’s creations are large and dark whilst the humans themselves are like petals. It displays a very possible contrast between the two parties, who argued over whether tradition or innovation was a more valid style when creating poetry. Poetry was definitely at a turning point, with new generations of writing poetry filled with emotion and lacking originality in structure and sometimes even in content.

Another Modernist was John Rodker, who didn’t identify as a member of these contrasting groups, but saw poetry as a way of communicating to the outside world from what he called the ‘void’. He was born lower class which didn’t enable him to read much older poetry. He said he liked to shock audiences. Therefore I think the quote by T.S. Eliot applies heavily to Rodker and his work. An example of one of Rodker’s first works is his poem “Item”. The poem is shocking as it holds a dark theme and shows that of “In A Station of the Metro “ but similarly it has a metaphor as the only verse. The metaphor compares a heart to some strings in a bag. The bag itself is very exotic as it is peacock blue and sapphire but holds some pieces of string which in turn are a complete contrast to the bag. You can also see that the strings or the heart are carried around as if they were in a bag. The complete and creative manner of the metaphor links to the idea that Rodker enjoyed to shock himself and others. His poems, however shocking and odd with their typography, were completely separate to those of the Imagistes. Contrary to Rodker, despite the random presentation, all these works were clearly carefully crafted as the reader can see through the interesting ideas that this poem presents.

Unlike the Imagistes, John Rodker wasn’t highly educated. He knew little about poetry and probably didn’t value it as an important part of helping to craft his work. However he did use free verse similarly to Imagistes, and favoured it as a way of expressing emotion. In this poem, as one can see in his poem “Item”. This use of free verse shows that like the Imagistes he valued innovation or novelty work. To summarise, he valued tradition little as he had minimal access to it, but similarly valued innovation as a key part of literature. Just as did the Imagistes.

In contrast Rodker had more similarities with the Italian Futurists. Like him they valued literary tradition to the lowest degree and viewed innovation as a new, or tradition versus innovation, is through the main purpose of their works. In John Rodker’s case, he wrote poetry to express conflict whilst ‘hanging in the void’. His poetry was made to shock which allows us to interpret that he was completely focused on innovation, as traditional work was made to seem beautiful like a work of art. In contrast, modern poets really made to innovate to shock in order to create change via a strong reaction which draws attention to a movement. With the Imagistes (particularly Ezra Pound) they wanted to rid poetry of emotion, but not the actual element of poetry itself, thus splitting equally the ratio of innovation and tradition. This therefore placed them in the middle as they intended to use both to create work ‘free from emotional silt’.

Finally, the Italian Futurists wanted not just to spark riot through upsetting their audiences, but also to destroy buildings like museums that celebrated the past rather than the contemporary revolution in machinery, as well as those who wished to preserve the past i.e. archaeologists. This to show that they didn’t value tradition and saw it as an enemy to their shocking words in freedom style, and that they valued innovation completely as it captured exactly what their art and literature was. In conclusion it is clear that during the early twentieth century, the avant garde groups which led this revolution in culture not only fought the critics and sometimes tradition, but also each other with their views of how new art and literature should be contrasting wildly. This sparked conflict which was as effective in changing culture as the First World War was in changing societies and warfare globally. These groups have, however, had a lasting effect on poetry that we see in our society. Poets such as T.S.Eliot are seen as the reader can see through the interesting ideas that this poem presents.

Another way to look at how these groups valued old versus new, or tradition versus innovation, is through the main purpose of their works. In John Rodker’s case, he wrote poetry to express conflict whilst ‘hanging in the void’. His poetry was made to shock which allows us to interpret that he was completely focused on innovation, as traditional work was made to seem beautiful like a work of art. In contrast, modern poets really made to innovate to shock in order to create change via a strong reaction which draws attention to a movement. With the Imagistes (particularly Ezra Pound) they wanted to rid poetry of emotion, but not the actual element of poetry itself, thus splitting equally the ratio of innovation and tradition. This therefore placed them in the middle as they intended to use both to create work ‘free from emotional silt’.

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Programme Officer’s comment

The incredible essay seems to reflect the fresh and exciting approach of the early-twentieth century Avant-Garde poets that was due to subvert it in a deadly expedient and informative text, with an impressive interpretation of some challenging texts. Great academic work should make its reader to explore the topic further themselves with other secondary sources. Instead of Pacifist writers, F.T. Marinetti, in particular, has written a very well-structured piece. Marinetti, in particular, has written a very well-structured piece. The tragic story of the Trojan horse, using this to claim Trojan ancestry. The Norman Ducal Family tree originated with Rollo (846-931) who was the grandson of Rollo’s son, and then took over the city, they evoked the Grecian story of the Trojan horse, using this to claim Trojan ancestry. The Norman Ducal Family tree originated with Rollo (846-931) who was the grandson of Rollo’s son, and then took over the city, they evoked the Grecian story of the Trojan horse, using this to claim Trojan ancestry. The Norman Ducal Family tree originated with Rollo (846-931) who was the grandson of Rollo’s son, and then took over the city, they evoked the Grecian story of the Trojan horse, using this to claim Trojan ancestry. The Norman Ducal Family tree originated with Rollo (846-931) who was the grandson of Rollo’s son, and then took over the city, they evoked the Grecian story of the Trojan horse, using this to claim Trojan ancestry. The Norman Ducal Family tree originated with Rollo (846-931) who was the grandson of Rollo’s son, and then took over the city, they evoked the Grecian story of the
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Explain why the Normans were Perceived as Different from Other Ethnic Identities in 11th-Century Sources?

Year 10, Key Stage 4

R. Boote, Year 10, Preston School, Yeovil

PhD Tutor: T. Chadwick, University of Exeter

Ethnicity and identity are constructed and relational. The Normans were made up of many different ethnicities, however they all had one Norman identity. They were described as warlike by 11th Century writers, who discussed their fighting tactics at the battle of Hastings, their clothing and how they styled their hair, and their leaders. These factors are what medieval writers, as well as leaders, would use to give a nation of people a sense of identity and unity.

The Normans were men of the North (Norsemen) who also had Danish heritage and ancestry. They also claimed Trojan heritage from other cultures, for example when Rollo conquered the city Luna and Dudo wrote of how he pretended to die and then took over the city, they evoked the Greek story of the Trojan horse, using this to claim Trojan ancestry. The Norman Ducal Family tree originated with Rollo (846-931) who negotiated with the King of Francia to give them the land that became Normandy and formed the base from where the Norman expansion began.

Othering was a common practice used by 11th Century writers, as well as in modern times. This is where a nation tries to describe weaknesses in other countries in order to make their nation seem more advanced. The Normans used this to make their leader seem strong and ferocious. For example, when the French broke a truce with the Normans and then begged Rollo to spare them, making the Franks seem ferocious. Rollo felt justified in being ferocious when invading the Franks. The Franks also used othering against the Normans, to make themselves seem a more peaceful nation than the Normans. This makes the Normans different from the Franks, creating an image of the Normans as warlike. Furthermore, other 11th Century sources describe the Normans as monstrous, othering them to make people scared of the barbaric Normans and spur them on to defend their land that the Normans might try to conquer.

Another way to look at how these groups valued old versus new, or tradition versus innovation, is through the main purpose of their works. In John Rodker’s case, he wrote poetry to express conflict whilst ‘hanging in the void’. His poetry was made to shock which allows us to interpret that he was completely focused on innovation, as traditional work was made to seem beautiful like a work of art. In contrast, modern poets really made to innovate to shock in order to create change via a strong reaction which draws attention to a movement. With the Imagistes (particularly Ezra Pound) they wanted to rid poetry of emotion, but not the actual element of poetry itself, thus splitting equally the ratio of innovation and tradition. This therefore placed them in the middle as they intended to use both to create work ‘free from emotional silt’.

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in contrast to this, mercenaries recruited by the Normans, like the Franks, saw William as a strong leader, who was dedicated to his subjects, but at the same time brutal and not afraid to show his ruthlessness in battle. This goes against what William of Poitiers wrote and could affect the Normans’ sense of identity by making their leader seem too merciless, which could make them scared of him.

In conclusion, battle tactics, clothing and hairstyles, as well as their strong leader, contributed to the Normans sense of identity. Although the Normans were made up of many different ethnicities, they created a ‘Normanness’ and were united through the Norman culture. Neither didn’t just exist in medieval times and still exist in modern society. Ethnicity and identity cannot exist without contact between separate cultures because otherwise those differences cannot be seen. Contact between the Normans and the Saxons, as well as the Franks, allowed the differences between their cultures to be seen, strengthening their respective identities as unique to their particular group. However, by the 12th Century the Normans’ ancestry and heritage was in decline and eventually the Norman identity was lost.

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How did friendship achieve equality in 1790s radical England?

Equality was the central aim of radical political movements in the 1790s, the 1789 French Revolution placed political focus on reform and equality, and the words liberté, Égalité, Fraternité resonated across the world. The optimistic radical ideology took root in England, where radical pedagogues sought to breed a new generation of thinkers concerned with equality, radicals explored the pursuit of equality even in the most trivial of matters, and fraternities such as the London Corresponding Society aimed to organise and further the radical movement. The extent of success of these movements – success being the achievement of equality in both the movement itself and in society – is indicated by the presence of friendship, with friendship defined, when combining the ideas of Aristotle and Cicero, as the presence of trust, truth and sentimentality in a relationship. Friendship was essential in achieving equality in the aforementioned examples due to its abilities to create respect, stimulate progress, protect personal equality, and the political essays of William Godwin, Thomas Holcroft’s essay and the political essays of William Godwin, Thomas Holcroft’s essay need to be used to show that when the correct form of friendship is applied to a situation, it can ultimately help pursue equality both in, and through, fraternity.

‘Liberté, Égalité, Fraternité’ seemingly indicated that fraternity would be considered of equal importance as individual liberty and equality. Yet in lacunae without fraternity, the latter was often sacrificed in pursuit of the former two, and vice versa. Friendship, claimed Cicero, can make each ‘treat the other as himself’, generating the most basic form of friendship. However, without friendship, ordinary people, who joined radical fraternities to demand a voice in decisions of the government, found their voice to be once again drowned amongst others; members of fraternities lacked the respect to listen to one another. This handed a motivation to corrupt to the masses: to be heard, they would have to hold an unequal proportion of power in France’s Jacobin Club, members motivated by the inability to voice their opinions could easily rise to unofficially dominate the Club. This removed stability – divisions were made on the very day that leaders, forcing unwilling members to choose sides. In the absence of respect, discussion turned into argument. Combined, the instability and arguments made the pursuit of equality in society inefficient. Friendship between members, however, can prevent such internal inequality and reduce the inefficiency created by instability. The London Corresponding Society encouraged friendship, community and individual equality through rotations of elected positions, and divisions ‘small enough to give every man his chance to speak’. It was not the organisation alone, but the intersection of it with the sentimentality of friendship that made it successful. The assured respect of individuality, encouraged by friendship, removed a motive to dominate the society. Through friendship, fraternities can become more equal, and therefore more stabilised, which would make them more efficient at achieving their goal: equality in society.

One could argue that added voices increases dispute, but friendship, by intersecting Aristotelian and Cicero’s ideas of sentimentality and truth, turns cold dispute into sympathetic discussion. Godwin’s belief, ‘(that) truth... must infallibly be struck out by the collision of mind with mind’, indicates discussion is vital, only the respectful discussion of a community bound by friendship can bring the truth (the theory of equality) into grasp. The practice of allowing all to have a voice, friend, allowing respect through friendship would both ensure equality within the friendship, and the pursuit of equality to be more easily achieved.

The path to achieve equality would also require friendships between fraternities, not just within them, but the greater the numbers in friendly co-operation, the more extensive the ‘collision of mind with mind’. In a more literal sense, their co-operation would allow fraternities to co-ordinate movements for an easier fight for equality, working together against the government’s persecution. This had been attempted in the French Revolution, but their fraternities were grouped and fuelled by fear – as shown by Robespierre’s final speech to the Convention – and were therefore ineffective at equally collaborating. Their co-operation would allow fraternities to co-operate for an easier fight for equality, working together against the government’s persecution. This had been attempted in the French Revolution, but their fraternities were grouped and fuelled by fear – as shown by Robespierre’s final speech to the Convention – and were therefore ineffective at equally collaborating.
founded by the government, their perseverance to organise another demonstrates the power of friendship in enhancing co-operation. Friendship could, therefore, aid the pursuit of equal rights for women by mitigating co-operation of the movement’s factions to spur on the movement as a whole.

As well as bringing together and equalising individuals and societies, friendship could stimulate their progress in pursuing equality. Godwin’s The Enquirer claims friendship could create emotional ‘arguments’ that are ‘more than talk’, providing ‘persuasion’ and ‘verbal agitation’ that are ‘more than mere words’. This pursuit of equality for women, as Godwin argued, could find a path into the logical movement, truly making the movement a pursuit of equality for all.

Unfortunately, despite friendship benefitting the pursuit of equality through fraternity in many cases, misuse or incorrect application of ‘friendship’ by societies could also result in the creation of emotional arguments that are ‘more than talk’, providing ‘persuasion’ and ‘verbal agitation’ that are ‘more than mere words’. This pursuit of equality could be thwarted by the emotional and sentimental voices that argued against friendship. This ‘useful’-ness, Godwin states, can make a society equal and, therefore, ‘universally happy’. Holcroft suggested that friendship could foster a community spirit, and the existence of a ‘fraternity’. However, this definition of ‘friendship’ appears to be absent from the world of women and black people. Their friendship with the rest of society meant they cared not for those not included by the boundaries of fraternities.

Friendship could reduce this inequality, helping surpass the masculine stem of ‘fraternity’ and the racism of the time. It created ungendered, uncultured sympathy, and allowed the women of the radical society to enter the world of friendship. By forming a friendship with Thomas Hardy when lodging at his flat, Olaudah Equiano became involved in the London Corresponding Society. Although his movements were ‘casual’, limited to a few meetings with the society, his friendship with the rest of society meant they cared not for those not included by the boundaries of fraternities.

Friendship could aid the pursuit of equality through the emotional appeal of the ‘universally happy’ which could foster a community spirit, and the existence of a ‘fraternity’. However, this friendship appeared to be absent from the world of women and black people. Their friendship with the rest of society meant they cared not for those not included by the boundaries of fraternities.

Fraternities of the French Revolution showed how important the emotional and sentimental aspects of friendship were. By forming a friendship with Thomas Hardy when lodging at his flat, Olaudah Equiano became involved in the London Corresponding Society. Although his movements were ‘casual’, limited to a few meetings with the society, his friendship with the rest of society meant they cared not for those not included by the boundaries of fraternities.

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Friendship could aid the pursuit of equality through the emotional appeal of the ‘universally happy’ which could foster a community spirit, and the existence of a ‘fraternity’. However, this friendship appeared to be absent from the world of women and black people. Their friendship with the rest of society meant they cared not for those not included by the boundaries of fraternities.
Prince Machiavelli praises Cesare Borgia almost excessively. For example, he writes in reference to Borgia, ‘There was one man who showed glimpses of greatness, the kind of thing that made you think he was sent by God for the country’s redemption’. Historians regard Borgia as having been Machiavelli’s muse, an inspiration for his politically realistic book. This is supported strongly because Machiavelli uses Borgia over and over again as an example of what a ruler should not be. He even says, ‘I wouldn’t know what better advice to give a ruler new to power than to follow his example’.

This work, The Prince, has been his most popular, because of its controversial content, and the arguably disturbing context of Machiavelli’s personal life. It has been found that one of the reasons for Machiavelli’s writings is to support his political career. His book was first to be released, and has given us a rich glimpse into his personal life, including his time imprisoned and the constant torture he endured. It is also because of the historical context of his writings that many historians have debated, at great length, that Machiavelli wrote out of ‘resentment’. It remains a source of great debate that some of the ‘most profound and insightful political thinking thus far in the European tradition’ was quite simply a product of bitterness. His work still remains important today, in spite of the story of its origin. The controversial content within his work has inspired a stir in political movements. Through his work, Machiavelli introduced politics as a study in its own right. Before his contributions ‘politics was strictly bound with ethics, in theory if not in practice’. Machiavelli was the first theorist to decisively divorce politics from ethics, and hence to give a certain autonomy to the study of politics. In spite of the controversy which has been attributed to him, and has the term ‘Machiavellian’ been used as an insult to describe a morally corrupt individual, Machiavelli’s The Prince reflects his deep-rooted wisdom. His book is still seen as a ‘how to’ manual of managing control of foreign lands. Interestingly, we must take care to note that Machiavelli did not invent ‘Machiavellism’ and may not even have been a ‘Machiavellian’ in the sense often ascribed to him. It is, however, for this reason, I have made it my endeavour to explore the man behind The Prince.

Some historians view Machiavelli as an individual who has been misunderstood, and described words which belittle him, and of which he is not deserving. Therefore, we must take what we have learned about him with an objective eye since a lot of Machiavelli’s words have been misinterpreted into something different. Not that this is completely the fault of historians, for it is widely noted that Machiavelli’s writings are maddeningly and ‘set quite apart from the precepts of political leaders, not least because the phrase ‘the ends justify the means’ which Machiavelli himself wrote of possessing and, they look to Machiavelli as a man with realistic ideas. A man who confronted the truth and his vision, and who might be rewarded with a vague description. He was the voice in the head of politicians, echoing that which they were afraid to say, in a bold fashion. Vincent Barnett says, in his book of Machiavelli’s letters, that Machiavelli was not afraid of challenging the most revered beliefs of his time. “Contrary to common opinion, I maintain that…” is a phrase that we find many times in his writings.

Though historians, such as Maurizio Viroli, are careful in their interpretations of Machiavelli’s work, so many understand that his influence in other aspects of the Renaissance period is very much in comparison to his influence in politics. For example, as our political mentor, therefore, we will benefit from his historical context of his writings. This line implies that Machiavelli did not write his book for the sake of the contemporary readers, such as Ardighelli who tarnished Machiavelli’s name. Or possibly pushed Machiavelli to become more driven in his efforts. This same letter does indeed, suggest Machiavelli’s determination but not quite to the point of ruthlessness. Rather, this letter only presents the positive character of a great political leader, we will be in a better position to choose such a leader, if we should encounter him or her. Machiavelli has yet another virtue of the good political adviser, which we might need today. He says, “It’s nonsense to think that chance is the source of all the important things.” We should take a read of it objectively. We should treat his work as the means to learn more about the man with ideas that were a little too advanced for the period of rebirth, but were not treat his work as the means to learn more about the man with ideas that were a little too advanced for the period of rebirth, but were not.

His book was his personal expression of how an ideal leader should behave, quite possibly how he would behave. This book showed Machiavelli’s remarkable understanding of how leaders really think, and how politics plays out. His work was an instrument in revolutionising our understanding of politics and, historians tend to agree quite easily with the statement that Machiavelli was a political practitioner– one who knew how to play by the rules. This is not at all to suggest that Machiavelli was the ideal candidate, for he is sometimes regarded as a man who was ‘far ahead of his time’. For one thing, Machiavelli’s ideas were heavily controversial, and that remains an understatement. He felt that the only way to advance was through the use of the power that chance might bring him back his political career. His plain backfire Machiavelli remained in exile for the rest of his life. His legacy was and remains a constipated which symbolises a new breed of politics, shrewd but devoid of morality!

Machiavelli’s wisdom is also evident when he writes of the act of putting others first. Easily, however, one can state that this line hints at bitterness and hurt regarding his exile from Florence and his time imprisoned. He writes against presenting yourself to the world in a way that might not be true. One might also say that he is not afraid of challenge. He is not afraid to write of his experiences of the nickname of Machiavellian’. Therefore, it was politics which was not yet ready for him. He was a man who were his ideas were never appreciated. He should give his work the chance he never had, no doubt his work remains in the limelight but, we should take a read of it objectively. We should treat his work as the means to learn more about the man with ideas that were a little too advanced for the period of rebirth, but were not.

I found that the pleasure of teaching a course on the Italian Renaissance was greater when I was able to show my students how Machiavelli’s work showed interest and determination in all aspects of the course. Such work and participation in particular was always at an enjoyable level. I would always try to find a way to teach my students how to critically analyse the concept and present it to a high standard. Having said that, we will focus on the complex and nuanced ideas and worthy of university level writing.

Machiavelli, for example his patient nature and his admirable pure of positive redemption. For example he writes, in reference to Borgia, ‘Far ahead of his time...he was not afraid of challenging the most revered beliefs of his time.’ Are these the words of a morally corrupt, cynical man... he was not afraid of challenging the most revered beliefs of his time.' Are these the words of a morally corrupt, cynical man... he was not afraid of challenging the most revered beliefs of his time. Perhaps, it was politics which never appreciated. He should give his work the chance he never had, no doubt his work remains in the limelight but, we should take a read of it objectively. We should treat his work as the means to learn more about the man with ideas that were a little too advanced for the period of rebirth, but were not.
Economically, the poor in the south of England were the Economic to be poor was (as one might expect) a lifelong struggle for outcry (the 1830 Swing Riots) are taken into account. As such, limited income, living conditions and subsequent political view is somewhat undermined when factors such as the 1800 and 1834; the final years of the Old Poor Law, before the poor faced in England.

The unpredictability of the harvests and the lack of options for those in the south of England exacerbated what had always been a traditionally poor region. To further the appeal, the increase in population occurred both in urban and rural areas. In years of strong harvests, the system was manageable, with outdoor relief reducing as harvests increased (1812, 1863). However, in years of poor harvests such as in 1812, poor relief in Sussex soared to 331 shillings per head (where the national average was 18.8s).

The increase was not just due to men returning from war 1800-1850 saw a huge increase in the population of England, which in turn put more strain on the already limited employment opportunities of the rural population. Thomas Robert Malthus predicted that the population of England, if not kept in check, would continue to grow as long as population redistribution (similar to the north of England), many essentially part-time labourers remained in their towns and waited for the harvest to come in, and with it their jobs. This increase was not just due to the seasonal increase in poor relief across England in 1812.

This dissertation will examine the lives of the poor between 1800 and 1834, the final years of the Old Poor Law, before the new legislation was passed in 1834. Whilst some have argued that Britain was the best place in the world to be poor, this view is somewhat undermined when factors such as the limited income, living conditions and subsequent political stress, were considered. As 1830 (Swing Riots) are taken into account. As such, to be poor was (as one might expect) a lifelong struggle for the people of southern England. The lives of the poor – their economic, social and political poverty.

Economically, the poor in the south of England were the lowest of the low. The so-called Speenhamland Counties (named after the 1795 meeting where the system was devised (Wikipedia, 2016)) were those at greatest risk of poverty, with the likes of Sussex, Buckinghamshire and Wiltshire receiving the highest rates of outdoor relief per head from 1800–1834 (Blaug, 1960). These counties were particularly poor due to their agrarian economies and lack of industrialisation – they relied on growing wheat as their sole source of income, but this way of life was unsustainable for such an overpopulated region. As Mark Blaug says: "substandard wages, are part of the mechanism which disposes a pool of surplus manpower in an under developed country", indicating that the lower wages that were paid, despite the assistance from the Poor Law, were not enough to keep families in the rural south of England from poverty, especially with so few jobs available.

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The social standing of the poor is clearly low, as would be expected, but the deeply personal stories provided by the Sounds’ letters and the heartfelt cry from Shelley proves that this anger at their conditions was not a struggle in which the poor were alone. However, whilst Shelley could write the word “starving” due to its emotion and rhythm, for those experiencing it this would not be an artistic device but a very real, and very cruel, truth.

**Political**

The rural, southern poor were criminally under-represented by Parliament. They had no say in the workings of government as there was not complete suffrage, and there was a complex structure around who could and couldn’t vote based on land ownership and constituency boundaries. However, this did not concern the vast majority Paupers’ only contact with government was their poor relief dispensers, and as such they fled against when circumstances conspired against them and pushed them past what they could tolerate, as in the case of the 1850 Swing Riots.

These were a series of attacks on agricultural property beginning in Kent in 1830. Threshing machines had been making the job of threshing corn more efficient by using fewer men to achieve a greater yield and farm owners installed them all over the Spennhamlows counties to minimise their labour costs. This was already competing for jobs and too poor, uneducated or simply too far away from any form of industry to take up another trade. Seeing machines doing farm workers’ jobs, farmers were more than likely to dismiss them as lazy, and through his impressive use of secondary and primary sources, Blaug (1963) situates their position within a broader international context. Through his study, we are able to learn the regional complexities of the condition of poor in the rural nineteenth-century England. In his nuanced analysis, he is able to draw out the regional disparities of the condition of poor and the differing ways in which they were being treated by law and the authorities. From these, we can deduce that the Threshing Riots was a manifestation of farmers’ anger towards the large reduction in the prices of corn, which they felt was not only unfair but would also threaten their livelihoods.

**Bibliography**


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**Social Sciences**

A Letter to the Lord Chancellor on Restorative Justice as a Viable Alternative in the Criminal Justice System of England and Wales

E. Clayton, Dyehouse Sports and Technology College, Hartlepool. Supervised by A. Oladayo, University of Durham

The Rt. Hon. Elizabeth Truss MP Lord Chancellor and Secretary of State for Justice Ministry of Justice 102 Petty France Westminster, L9H 9AJ

Minister Truss,

May I please introduce myself, my name is E and I am currently studying at Dyke House College, Hartlepool. I am formally writing on behalf of the UK public to state that the current criminal justice system has its disadvantages and I am formally writing on behalf of the UK public to state that the current criminal justice system has its disadvantages and the function that it provides is increasing in relevancy for certain types of offenders, especially young and petty ones. In this letter, I intend to outline issues and limitations in the criminal justice system, state three types of restorative justice approaches and discuss three different restorative justice models and how they could be beneficial in the UK.

I will be considering how restorative justice approaches can reduce re-offending rates and studying cases to strengthen this argument.

Challenges facing the criminal justice system

There are many challenges currently facing the criminal justice system and prison system in the UK, including overcrowding in jails, costly court sessions, petty criminals being perceived as more serious criminals in jail, influencing them to commit more serious crimes on their release. Also, prison can sometimes be seen by the less fortunate, who may live in untidy conditions like homelessness, as a more attractive living option for them, offering shelter and food. This reiterates the belief by some, that under-privileged people could be more prone to committing crimes, suggesting to some extent that the prison system’s isn’t always the best punishment. When prison is the only punishment given, the offender does not get to see the consequences and impact of the crime they have committed on their victim and are more likely to do the same thing, or worse when released. This is where restorative justice practices differ, as these practices show that restorative justice reduces re-offending rates by 14%.

Solution to the criminal justice system

I feel that the most viable solution to reduce re-offending rates within the criminal justice system is restorative justice practices. The various stages within it allow the victim and the offender to discuss the offence and how to resolve what has happened. It can be used anywhere to prevent conflict and repair harm caused by a previous crime.

When restorative justice meetings occur, they allow the two parties to discuss a suitable punishment for the offender, sometimes with the influence of family members or youth advisors. Restorative justice is often applied to non-violent criminal trials. One of the main differences is that they are undertaken in a much less formal atmosphere. A courtroom is a very formal setting including the offender, the victim, a judge, the public, and the police. Restorative justice is saved from what could have been spent in the traditional criminal justice system.

At the end of the trial the offender is either found guilty or not guilty of the crime and if found guilty the judge alone will decide on the punishment, without any influence from others. Restorative justice practices involve victims of crime throughout the process, enabling them to have an input into what the punishment should be, which could help to move them forward after the crime.

Three types of restorative justice practices

There are three different types of restorative justice practices used within the criminal system. The first example is victim-offender mediation, which is when the victim of a crime has a one-to-one meeting with the offender and is monitored in case any conflict occurs. This practice is mainly used for less serious crimes and allows the victim to try to make the offender understand their feelings.

An advantage of this method is that the victim is entitled to a fair suggestion of the punishment the offender should face. However, this isn’t always suitable, depending on the relationship between the two parties, for example, if the victim has a pre-existing judgment of the offender, this could prejudice their opinion of them and perhaps encourage them to suggest a harsher punishment, meaning it could possibly be unfair to the offender. This method differs from a criminal trial, as the atmosphere isn’t as tense and allows the people involved to have a fair say. A statistic to support this is that 85% of the people who took part in this process were satisfied with the outcome.

Another method is conferencing, which involves the families of both the victim and the offender. Again for the safety of both parties, the meeting is monitored. An advantage of this method is that having loved ones around them may be comforting and supportive for both parties. A disadvantage of this method is that the family may interfere too much and could over-exaggerate to influence the side of the story. This method differs from a criminal trial, as the family have people close to them supporting their reasoning. Research from a professor of criminology at the University of Cambridge suggests that the conviction rate was 28% from those who attended a restorative justice meeting.

The final method of restorative justice is sentencing circles, which is when the victim, offender, their families and the police are involved with deciding the punishment of the offender. An advantage of this method is that there are more trained people to examine the meeting and agree with what is being suggested as a punishment. A disadvantage of this method is that it starts with a prayer, which could make some people who are not religious feel uncomfortable. Furthermore, a room full of people could be quite daunting and tense.

Programme Officer’s comment

This is an impressive piece of work. D demonstrates an excellent understanding of the historical context and shows a broad knowledge of the political, economic and social condition of the poor in early nineteenth-century England. In his nuanced analysis, he is able to draw out the regional disparities of the condition of poor and the differing ways in which they were being treated by law and the authorities. From these, we can deduce that the Threshing Riots was a manifestation of farmers’ anger towards the large reduction in the prices of corn, which they felt was not only unfair but would also threaten their livelihoods.

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It could make some people shy and unable to express themselves as much as they would in a one-to-one meeting. This method differs from a criminal trial because it is much more informal. People in this meeting could be more relaxed, allowing everyone to have a fair say.

All methods of restorative justice are more cost effective than criminal trials and have provided strong points for you to evaluate. I believe that restorative justice has a place in the criminal justice system, leading to successful outcomes in a number of criminal cases with proven statistics. I hope that you are able take all of my points into account and see restorative justice as a viable solution to certain crimes.

To conclude, I have stated various reasons as to why the current criminal justice system is not appropriate for all crimes and have made some clear points for you to evaluate. I believe that restorative justice has a place in the criminal justice system, leading to successful outcomes in a number of criminal cases with proven statistics. I hope that you are able take all of my points into account and see restorative justice as a viable solution to certain crimes.

Thank you for taking the time to read this letter. I would very much welcome a reply to hear your thoughts if you are able.

Yours sincerely

E. Clayton

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A Letter to the Lord Chancellor on Restorative Justice as a Viable Alternative in the Criminal Justice System of England and Wales

Year 9, Key Stage 3

I. Fitzpatrick, Dykehouse Sports and Technology College, Hartlepool, Supervised by A. Olayode, University of Durham

29th March 2017
Ministry of Justice Headquarters
102 Petty France
Westminster
London
SW1H 9AJ

Subject: Restorative Justice as a Solution to the Disadvantages of the Criminal Justice System

Dear Mrs. Truss (Lord Chancellor and Secretary of State for Justice),

I am writing to discuss my views about the current Criminal Justice System (CJS) and to highlight potential solutions to re-offending rates. I intend to talk about the inadequacies of the current system and the benefits of Restorative Justice and three models on Restorative Justice.

I believe the CJS is angled very much at preventative measures, around re-offending rather than punishment. Some would concede that we have gone too far in trying to rehabilitate and punishments no longer are commuting of the harm done to the people affected. This method could be deemed more fair than the CJS as it avoids meting out inadequate sentences and failing to tackle underlying issues such as drugs and social matters. I would suggest that some re-offenders are now simply taking advantage of the often used system to avoid harsher punishments, for example, community punishments and drug-testing orders which are regularly breached but rarely prosecuted.

It appears there are countless underlying issues not being addressed. For example, there are clear definitions ‘class’ as opposed to that of many years ago which was reserved to ‘upper’ and ‘working’. It is now recognised that we have almost lower ‘class’, namely generations of people who have never worked and reside in low socio-economic places where acquisitive crime and subsequent re-offending rates are high. To put this ‘lower class’ into perspective punishment, education and reparation through the CJS as a viable solution to a crime is seen as a viable solution to a crime is seen as a viable solution to a crime is seen as a viable solution to a crime.

Historically, prison was seen as harsh punishment, providing relief for society who had suffered at the hands of offenders. In the last 20 years, however, the idea of prison has changed and it is now seen as an opportunity to educate, giving the general public a chance to meet their victim, the frequency of reoffending fell by 27% from 2013, statistics show that 33% of victims suffered from fear, 23% from anxiety and 21% from depression. This method could also be beneficial because it could support emotionally affected victims who have been affected by a crime. From 1995, statistics show that one in nine black children have an incarcerated parent, this inequality. Statistics show that in the US, one in three black males have a chance of being imprisoned during their lifetime and that one in nine black children have an incarcerated parent.

Participants in Restorative Justice as part of a sentence can be used if the victim and offender both agree to re-offending rates. It is this method could possibly teach offenders to be responsible citizens and have provided strong points for you to evaluate. I believe that restorative justice has a place in the criminal justice system, leading to successful outcomes in a number of criminal cases with proven statistics. I hope that you are able take all of my points into account and see restorative justice as a viable solution to certain crimes.

To conclude, I have stated various reasons as to why the current criminal justice system is not appropriate for all crimes and have made some clear points for you to evaluate. I believe that restorative justice has a place in the criminal justice system, leading to successful outcomes in a number of criminal cases with proven statistics. I hope that you are able take all of my points into account and see restorative justice as a viable solution to certain crimes.

Thank you for taking the time to read this letter. I would very much welcome a reply to hear your thoughts if you are able.

Yours sincerely

E. Clayton

Programme Officer’s comment

Producing an academic text of this type is very challenging – the student must strike a fine balance between a persuasive letter, a robust, well referenced, academic argument. This letter is a fine example of such a balance. The language employed throughout reflects a mature, and the author makes confident use of legal terminology. This letter is a fine example of such a balance. The language employed throughout reflects a mature, and the author makes confident use of legal terminology. Producing an academic text of this type is very challenging – the student must strike a fine balance between a persuasive letter, a robust, well referenced, academic argument. This letter is a fine example of such a balance. The language employed throughout reflects a mature, and the author makes confident use of legal terminology.
Sentencing Circles

A Sentencing Circle is used in more severe cases were the victim or offender may not feel assured talking openly. Participants are: the victim/auxiliary to the victim, a judge and any other additional roles if necessary, for example, youth court members or social workers. Also forming a second circle of chairs will be professionals or interested parties. The room is organised in a structured format, dividing the two parties on either side of a circle of chairs and the principal of the discussion in the centre. This model is run comparable to a courtroom, where the victim can observe the trial and argue by the judge. The idea of a stand-in-speaker for the victim would be beneficial in communicating the views of the victim particularly in more serious matters.

It often begins with a prayer followed by a discussion upon addressing the impact of the offence. This form of Restorative Justice may not be the best way to increase confidence after a loss through a crime; however, it allows people to examine causation factors. Management of the sentencing circles, determine that the victim must only voice or share voluntarily, no one and but the judge must deliver the outcome. Criminals are less likely to offend 15 months past the circle, rather than 15 months prior.

Models of Restorative Justice

Within Restorative Justice, there are many organisations, which offer support and guidance. The organisations that I have chosen to discuss are Sycamore Tree (UK), Restorative Opportunities Program (Canada) and the Victim–Offender Reconciliation Program (Australia).

Sycamore Tree: UK

Sycamore Tree is a programme that serves to teach the practice of Restorative Justice to those involved in prisons in the UK. Prisoners on the programme experience victim awareness, and are taught over a six-week period the impact of the crime. The offenders are encouraged to consider the other side, what is positive it would have on the prison system and the victim if the offender admitted responsibility for their actions. The justification behind my choice is that many offenders are ostracised because they have not been understood and simply revert to type. The staff help them open up their thoughts regarding victims and crimes and discuss reasoning behind the crime. I feel this is beneficial because many victims are poorly represented, so by allowing criminals to realise the impact of offending acts in deterring them in the future.

A former prisoner advocates that as an offender, you visualise yourself as the victim rather than other people. He quotes “I never looked at the victim, I didn’t have any victims. I always called myself the victim.” After hearing a victim’s story, he didn’t realise the severity of the crime and impact made on someone’s life. After writing a letter to the victim whose house he had entered, he realised what 60% of the criminals are who are predicted to re-offend within 2 years. He is now part of the 73% who are no longer offenders due to the help of Sycamore Tree.

Restorative Opportunities Program: Canada

Restorative Opportunities Program is a correctional service of Canada that is available to people who have been affected by a crime – victim or proxy such as a family member. This Restorative Justice is based around victim-offender mediation. This is voluntary and aims to share ‘needs of the participants’. This procedure is not focused on reaching a settlement, but rather an open communication between the two parties. I have chosen this model as an example of Restorative Justice as it is an opportunity for people who have unique needs and don’t want to follow the traditional CJS. A victim was attacked in a pub. The attack resulted in 50 stitches in his face and elbow, and inability to move his arm. Through Restorative Opportunities program he quotes, “I figured the Restorative Justice process would help, but the shock was how much it helped me.” I hold the viewpoint that this process can make one truly examine the situation, giving its offender focus. In my opinion the most important part of a case is the effect that something has had on the victim. RO shows that 88% of offenders stated that it was useful to them after 3 months, compared to 2.1%, and only 26% who returned within a year. In contrast to 92% that did not experience Restorative Justice.

Victim–Offender Reconciliation Program: Information and Resources Centre: Australia

Victim–Offender Reconciliation (VOR) is a Restorative Justice group based in Australia that works with a consenting victim and the offender to come face to face with each other examining their issues. A trained mediator supervises this voluntary process. They suggest that the crime is ‘personalised’ so offenders should absorb the consequences of their actions, and it also stipulates victims (often forgotten by the CJS) to share their views about the situation, contributing to the healing process of both parties. I have chosen this, because I feel the idea of ‘letting the victim speak’ is important in recognising the impact of crimes which will only be beneficial in the UK because it is ‘victim-focused’ and conveys their views to the offender rather than through a third party such as the Police. Surely this is more impactful than simply viewing it as another one of the 200,000 crimes recorded each day.

A victim of theft remained close to her sons’ friends after his death. This changed when a cheque was stolen and attempted to be cashed at a shop. She says, “I wanted to balance and identify quickly what works VOR, after being advised by a neighbour. Through this process the friendship was resumed after her views were heard. Overall, it is shown that those offenders who participate in VOR had a 34% lower rate of reoffending than non-participants.

I feel that the CJS in the UK is slowly moving in the right direction in using Restorative Justice as a recommission and prevent offending as opposed to a solely punishment-based approach. Statistics support this. We now need to strike a balance between identifying what works and what is being abused to prevent problems festering and growing.

In the interests of justice, punishments are inevitable, however, I believe that the understanding of we need to; understand and adapt prevention rather than cure ideas. Having the foresight to tackle issues before they manifest themselves is vital – Restorative Justice and early intervention not only aims to prevent future crimes it also caters for understanding between victim and offender to aide with closure.

Thank you for taking your time to consider my thoughts.

Yours faithfully,
L. Fitzpatrick

Should Pharmaceutical Companies be Banned from Funding Disease Awareness Campaigns?

J. Parry, West Monmouth School, Pontypool Supervised by R. Williams, Cardiff University

I will be covering my opinion on whether pharmaceutical companies should be allowed to fund disease awareness campaigns. I will examine opposing arguments. I will support my claims.

Programme Officer’s comment

“Whatever the case, it is very challenging – the author must strike a fine balance between a persuasive letter and a robust, well-referenced, academic argument. This letter is a fine example of the kind of argument we like to see. The author has provided a compelling introduction, and the author makes confident use of legal terminology when considering the case. To support your argument, you have the well-integrated argument to avoid making points out of order. The letter is well structured, building evidence and arguments in a logical fashion. With the letter truly to be sent to the Minister, there is little doubt that they would be compelled to examine the issue further.

S. D. Co, Asia Director, North of England, The Belfort Club

This is known as disease mongering, an issue which proves harmful to society by promoting ‘diseases’ in order to encourage the sales of drugs. Disease mongering comes together effectively with medicalisation and pharmaceutical companies being funded is often not a disease at all – but instead, a condition socially constructed to appear negative or requiring medical treatment. By highlighting symptoms that are common and easily offsetting the presence of drugs, it manipulates people to believe they have a life-threatening illness – when they might only have a natural cause of hair loss.

For example, before 1987, people who were anything other than heterosexual, were considered to have a mental illness. This has now been corrected as society has progressed, although some issues remain in need of de-medicalisation, as they are being used to convince people they need to buy medicine. Consequently, I agree that pharmaceutical companies should be banned from funding disease awareness campaigns, but only to an extent. I will justify my case and examine opposing arguments throughout this paper while analysing evidence to support my claims.

A mille–list of disadvantages can be drawn for why drug companies campaigns is bad; however, there are some positives of the extra form law in place to prevent conflict of interest, these positives can live their potential and become useful to society. Firstly, the law is needed so that pharmaceutical companies should only be allowed to fund disease awareness campaigns with a firm law in place to prevent conflict of interest, these positives can live their potential and become useful to society. Secondly, it is legal to prevent disease mongering and this law can be used to help the audience – not a passive way to the drug company.

Furthermore, it would be good as it allows the creators of the campaign to confer with the company about any issues concerning particular medications, improving the

Should Pharmaceutical Companies be Banned from Funding Disease Awareness Campaigns?

Year 9, Key Stage 3

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The visual imagery in this report does not spark any major discussion, as the shot establishes the location of what looks to be a school, which supports the basis of the report. The majority of the report uses a close-up shot, which intimately focuses on the face of the Asian boy. With this shot the audience can recognise the emotional reception of the interviewees, and in this case the boy’s expressions seem to differ, as when he is talking about his education and the subjects he enjoys, he seems a lot more comfortable. In contrast to when he is asked about his parents he appears more uneasy and puzzled, as though he was not intending to be asked about such things.

Undoubtedly, the popular stereotype of the ambition of younger Asians as imposed upon them by their parents is reinforced. Furthermore, the report clearly seems to steer the Asian boy in a particular direction which may suggest that the topic of the interview, the boy’s achievement in passing his exams, was just a convenient excuse to accentuate some of the issues many British people had with Asians, such as the lack of integration, and to indirectly show the audience that these issues are still prominent.

Similarly, in Smithwick (a small town near Birmingham, which is not exactly the notoriety’s remit) in the Midlands, a British Asian boy after he had just passed his ‘11 Plus’ examinations, to go to a Grammar School. At the time, a popular stereotype of Asians was that they were ambitious and driven, which was supported by a newspaper article published in the 1970’s describing Asians as ‘those who put learning before leisure’. But often this ambition was said to be forced upon them by their family, as rather than simply encouraging their children, it was assumed that they put a lot of pressure on them, so that the child would have a better life. The British Asians parent living out her ambitions through her children.

This stereotype is greatly reinforced in this ATV News clip through the interviewees choice of questions such as ‘what does your father want you to be?’, which is one of the first questions asked, reflecting its significance to the reporter. Not only does this question reinforce the stereotype of the authoritarian Asian parent, but also his choice of the words ‘what does your father want you to be?’, which is notable for the stereotype in the Asian home and the more passive and ‘submissive Asian woman’. There is a constant mentioning of this Asian boy’s parents throughout the video, and the looming presence of the ‘parents’ in the interview, almost drifts away from the supposed topic of the video by assuming that [his] parents can’t speak any English at all, which seems a poor choice of words. It seems here as though ATV News is trying to emphasise and give evidence of the lack of integration of Asians into the British lifestyle.

A definition of disease mongering almost perfectly as drug companies funded a disease awareness campaign which unfortunately tied in very appropriately with their new drug. Also, the drug they produced was a one of a kind and tackled a problem that psychological pain, is hard to diagnose and the propaganda surrounding the illusion could deceive people into thinking Lily and Boehringer Ingelheim’s new drug is the only solution. Also, many people who have depression often have other illnesses. It isn’t uncommon for people to have depression as a side effect of chronic conditions or even cancer which causes pain. Psychosomatic pain, is hard to diagnose and the propaganda surrounding the illusion could deceive people into thinking Lily and Boehringer Ingelheim’s new drug is the only solution. Also, many people who have depression often have other illnesses. It isn’t uncommon for people to have depression as a side effect of chronic conditions or even cancer which causes pain. Psychosomatic pain, is hard to diagnose and the propaganda surrounding the illusion could deceive people into thinking Lily and Boehringer Ingelheim’s new drug is the only solution. Also, many people who have depression often have other illnesses. It isn’t uncommon for people to have depression as a side effect of chronic conditions or even cancer which causes pain. Psychosomatic pain, is hard to diagnose and the propaganda surrounding the illusion could deceive people into thinking Lily and Boehringer Ingelheim’s new drug is the only solution. Also, many people who have depression often have other illnesses. It isn’t uncommon for people to have depression as a side effect of chronic conditions or even cancer which causes pain. Psychosomatic pain, is hard to diagnose and the propaganda surrounding the illusion could deceive people into thinking Lily and Boehringer Ingelheim’s new drug is the only solution. Also, many people who have depression often have other illnesses. It isn’t uncommon for people to have depression as a side effect of chronic conditions or even cancer which causes pain.
Asian practice. Just by watching this news report, we can understand why he even has to justify his lack of participation in the Asian tradition and bring the community together.

Although ATV News may have had good intentions with this report by trying to get local people involved, they did not fail to reinforce popular stereotypes of Asians at the time. Particularly with Asian women, who were stereotyped as extremely similar and interchangeable in ATV News, three Asian women whilst they are decorating their doorstep and his use of language and tone of voice clearly reinforces this stereotype. Swallow states that’s ‘very clever’ in a very patronising tone, as if he is speaking to a child. In comparison to how he speaks to the next male interviewee, we can see Swallow being a lot more condescending and gentle towards the woman, and therefore trying to say anything to upset them because of their supposed weak and fragile character.

It also reinforces the isolated stereotype and the separation between the Asian woman and man. Swallow states that ‘it’s our Christmas we put a Christmas tree in the house don’t it?’, the phrase ‘like the Indians do’ again reinforces that a white man and asks ‘have you decorated it like the Indians do?’, the phrase ‘like the Indians do’ again reinforces that it’s our Christmas we put a Christmas tree in the house don’t it?’, the phrase ‘like the Indians do’ again reinforces that a white man and asks ‘have you decorated it like the Indians do?’

Moreover, the fact that they interview all of the Asians in the first half and all of the white people in the second half of the clip, just highlights the separation between the groups and the differences between them. One could argue that the clip displays how the Asians living in Britain are still holding onto their cultural heritage and therefore the hostility of the white people towards these new cultural traditions is natural, as just like the Asians, they are loyal to their British cultural heritage and possibly threatened by anything drastically different. This may be true but completely contradicts the concept of ‘multiculturalism’, which was supposedly more distinguished in the 1970s. This report casts the prospect of ‘multiculturalism’ as more idealistic and infers that the white people are actually looking at the Asian women as ‘submissive but dainty sex objects’. The use of ‘the noddy’ camera shot in the beginning shows the reporter agreeing with what the interviewee is saying, this is fairly positive as it implies a real effort by ATV to understand an aspect of the Asian culture. However, the use of an extremely close up shot on one of the Asian women’s faces, though it is focusing on her beauty rather than filming the saris, which was the intention of the interview. Therefore again the desirable object stereotype of Asian women is reinforced with this camera shot. Although this report seems to raise real hope of the combination of the Asian and Western women through sharing fashions, it ends rather negatively, with the reporter saying ‘the Western women might think a skirt and blouse would be easier’. This ends the report with a closing sentence that may highlight the difficulty and effort it takes for the white and Asian communities to integrate.

The visual imagery used in the report when focusing on the woman’s face, though it is looking at their beauty and is explaining how they are apparently becoming more Westernized. The fact that he cannot learn about Asian culture by asking many questions about the saris. Also by admiring them, it may have encouraged more people to buy them and further reinforce the stereotype. However, that does not mean the news report does not heavily reinforce popular Asian stereotypes.

The fact that the Asian shop owner is male reinforces the hardworking, ambitious stereotype and also reiterates the controlling male stereotype as he is the one who owns the store and questions anything about the saris. Furthermore, the women in this report have little time to speak compared to the male, and this lack of voice reinforces the submissive and dominant male stereotype of Asians.

Of course, stereotypes have to come from somewhere, but ATV makes no effort to challenge these popular stereotypes but instead reinforces them so heavily that the stereotypes are exaggerated. To conclude, this essay has demonstrated that ATV did reinforce these popular stereotypes of Asians and only created a more hostile environment in Britain which divided the whites and the Asians even further, and possibly partly contributed to the continued racial tension Britain faces today.

**Bibliography**

Primary

- L. was a pleasure to teach. She showed a keen interest in the topic and the school environment. I really enjoyed working with L. I had to use both primary and secondary source material throughout her essay and her excellent analysis of the news reports discussed throughout. L. also demonstrated an ability to dig deep into sources and her writing was to a high standard. I wish her best in whatever she decides to do in the future.

Secondary

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**PbP Tutor’s note:**

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Can Mother Tongue Education Promote Social Justice for Indigenous Minority Groups?

Mother tongue education refers to the teaching of students within public and private schools in their first home language. By doing this it can be argued that social justice, which describes a fair distribution of opportunities and privileges within a society, will be promoted for indigenous individuals who may have become marginalised from the social majority. Many feel that by employing mother tongue-based educational programmes, indigenous groups may be preserved along with the self-worth of many communities: schools are known to play a key role in the assimilation of minority groups, resulting in many young children learning in a language which is not their own. In fact, students have previously been punished for speaking their mother tongue within schools and whilst this is not common today, a strong message is seemingly still communicated to them that if they desire to be accepted, any loyalty to their home language and culture must be abandoned. This could potentially result in a subsequent loss of their mother tongue as they may become less likely to pass it down to future generations. This tells us that mother tongue education can be highly important in the process of promoting social justice for indigenous minority groups as without it, the native community will experience extremely damaging effects. This essay will therefore focus on promoting social justice, methodological and practical factors surrounding the importance and relevance of mother tongue education, such as the different models of mother tongue education, success rates, and the socio-economic benefits that this may require. From these considerations it seems that mother tongue education is indeed highly capable of promoting social justice for indigenous minority groups. However, it is also clear that there are many factors that need to be overcome in order for the practice to prosper.

To begin I will discuss some of the ways that mother tongue education may be implemented. There are two main models of mother tongue education: the transitional model and the maintenance model. In the transitional model the mother tongue is used as the first and second language, thus it is only taught during the first few years of schooling. In contrast, the maintenance model places higher emphasis on the first and minority language being sustained throughout the student’s education. Both models can be said to have positive and negative consequences. Finally, this transitional model is not without some drawbacks, especially because it only provides short term education in the mother tongue, which may not promote as much justice as the maintenance model which sustains the mother tongue. This may also affect the fluency of the child’s mother tongue language too. Despite this, the transitional model in fact appears to be the most popular. This could be because it is thought to be less expensive and possibly due to the reasons discussed in my next paragraph such as how when teaching starts in the mother tongue the experience of education becomes more natural.

The maintenance model has also provided evidence of success. In Ethiopia, local language policy, which combines long-term mother tongue education with Amharic and English (thus bilingualism), has resulted in lower dropout rates and higher retention. Additionally, in Guatemala, grade repetition in bilingual schools is roughly half that of traditional schools, and dropout rates are 25% lower. This tells us that by using mother tongue education, schools can help children to relate their learning with experiences brought from home. The maintenance model has also provided evidence of success in favour of the dominant non-indigenous society. Additionally, in Peru the programme has only reached rural indigenous children as parents in the non-indigenous Spanish speaking society are not expected to send their children to these schools, credibility of the programme is restricted, and indigenous parents are led to believe that mother tongue education is in fact second class to the leading style of teaching.

Although mother tongue education may be in place in some countries, it still may not promote total social justice for all indigenous minority groups as they may only have limited control over the programmes. Alternatively, the Netherlands case study could potentially offer to similar programmes. However, the programme is not yet fully standardised, this could lead to a wider population of peoples learning the languages as they could be more accessible. This could lead to these languages being saved within the country and perhaps, some indigenous groups being able to communicate on a broader spectrum thus offering increased chances of social justice. This can therefore mean that although mother tongue education may be in place, it is more likely that minority groups will gain the justice that they deserve.

Decision making programmes are not carried out efficiently, they may in fact be promoted. Firstly, the transition model appears to be tokenistic and a result, teachers are more able to be creative in designing the curriculum and approach of the classroom, which is likely to lead to further improved learning outcomes. Furthermore, this can also inspire pupils to go on to have successful futures too by having native speaking teachers it demonstrates that a second language is not the only thing that can bring the pupils success. This suggests that by using mother tongue, schools can help children to learn their language the national language is best served by being proficient in both English or ‘lowland’ language. The fact is that in the fact that in numerous countries a high value is placed on international languages and local language instruction is, as mentioned previously, seen to represent a second class education. This may lead to less community support for mother tongue education programmes, and could lower the self-worth of indigenous peoples, showing that if these programmes do not cater to indigenous needs sufficiently, they will still fail to hinder the development of social justice for indigenous minority groups. Despite this, it is clear that if they are efficient, much justice is promoted.

On the other hand, one key argument is that whilst mother tongue education may promote social justice for some indigenous minority groups, this may not happen for all. An example of this is seen from a case study which focuses on the issues surrounding language rights and variation for sign language within the Netherlands. This study demonstrates that in order to create a curriculum with relevant materials for students who wish to study in their mother tongue sign language, there are many socio-political hurdles to the teaching of the subject. Additionally, government officials state that the language cannot be recognised. However, several important issues have in fact stemmed from this arrangement. Firstly, the process of producing a standardised lexicon in any indigenous minority language risks recontextualisation, which refers to the selective and preferential treatment of specific groups – this may cause certain groups to feel excluded, thus meaning that they would not gain full social justice despite mother tongue education being in place. Furthermore, the argument from officials that the language would only be recognised if it becomes standardised may be said to demonstrate the idea that indigenous minority groups are subject to the authority of higher powers, showing that they do not have a fair say, which could potentially infringe on basic human rights. This could therefore mean that although mother tongue education may be in place in some countries, it still may not promote total social justice for all indigenous minority groups as they may only have limited control over the programmes.

Can Mother Tongue Education Promote Social Justice for Indigenous Minority Groups?
may affect the fluency of students in their mother tongue and thus possibly not provide full justice. Additionally, time is another concern in terms of the period needed to develop strong materials, to train teachers and to develop a new alphabet. This therefore implies that in any mother tongue education programme, gradual phasing is important. Although social justice can evidently be promoted through these programmes, much time and care must be taken.

In conclusion, it is clear that mother tongue education can help to promote social justice for indigenous minority groups. This form of instruction can help to cultivate wider recognition of the rights of indigenous groups, and can also offer young students the opportunity to prosper in their academic life. On the other hand, it is also clear that there are challenges that need to be overcome for mother tongue education to promote true social justice. Time and cost play a key role in this because if the programmes are not planned with care, it is likely that mother tongue education would be hard to achieve, especially in countries with less stable economies. Furthermore, if the tuition is not implemented morally, such as by disregarding certain members of indigenous communities, an infringement of human rights may occur. However, whilst these factors are undoubtedly important, it seems that mother tongue education is a major tool in the promotion of social justice for indigenous minority groups, and could provide even more integrity if paired with other methods, such as reviewing current laws and policies that may be hindering the advancement of these groups, too. It can be therefore be concluded that despite the challenges it is faced with, mother tongue education can indeed play a significant role in promoting justice for indigenous minority groups.

PhD Tutor’s note
S. was an absolute pleasure to work with. She engaged with the topics of the course in a very thoughtful and sophisticated way. Her final essay was beautifully written, carefully structured, and showed great levels of insight. I have no doubt that S. will excel in her future studies.