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EXPLORING BIG QUESTIONS & IDEAS

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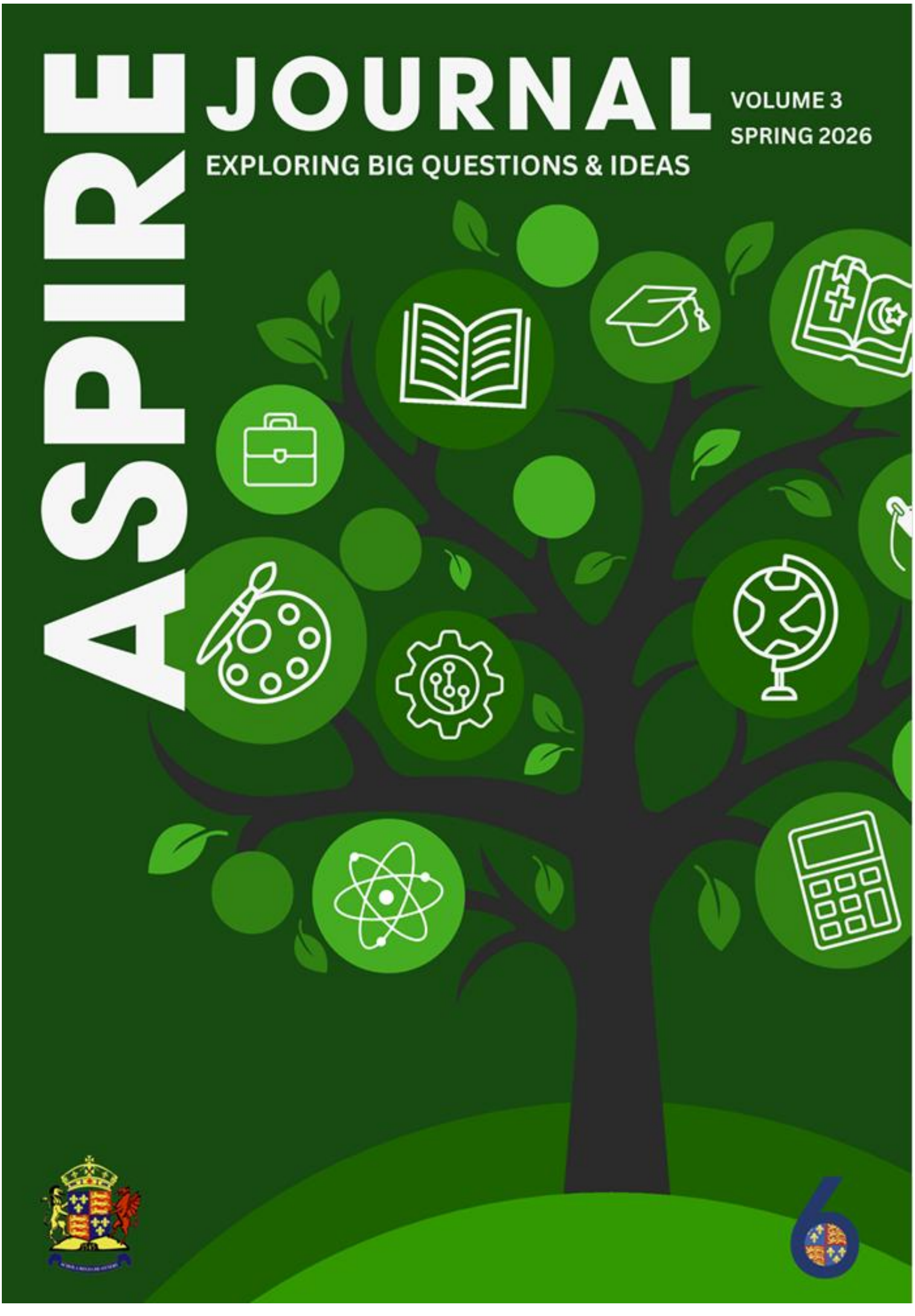

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Foreword

Step-up and Aspire is an integrated partnership between the King's "Aspire" programme and the "Step-up" programme that is run by New College, Oxford. The Year 12 Aspire side of the programme is primarily designed to provide a vehicle for 'super-curricular exploration' - that is delving more deeply into a subject of interest - within a school community of like-minded individuals.

At the heart of this super-curricular exploration is the concept of "big questions". Big questions tackle complex ideas and reflect the kind of critical thinking students undertake at university. They aim to challenge students with debates and ideas that go beyond what is covered in the classroom – both in a subject-specific and more general sense – as well as promote broader thinking and encourage intellectual curiosity. By regularly engaging with big questions students will develop fluency in expressing ideas with clarity and thinking through unexpected problems.

This journal therefore reflects some of the big questions that our Year 12 Aspire students have been wrestling with so far this year. To help them tackle these questions, students have been developing skills relating to academic research, extended writing and dialectical reasoning. Dialectical reasoning is a method of reasoning that firstly develops a thesis and then develops a contradictory antithesis, both with rationales, and then combines and resolves them into a coherent synthesis, with the ultimate goal being the search for truth.

You will see this process of dialectical reasoning in the articles contained within this journal, with some of the articles being streamlined "think pieces" and others being more in-depth pieces of research. But, whatever the case, we can assure you that no AI was used! All articles were fully researched and written by students who not long ago were sitting their GCSEs and who are currently undertaking their A-Level studies alongside the Aspire programme. There are 207 separate footnotes in this journal and each of those references represents an individual act of research and analysis.

Finally, whilst the students were instructed to advance a line of argument in their articles, we are of course aware that their conclusions do not represent "right answers". Indeed, big questions very rarely have an answer that everyone can agree on. Instead, we hope that the pieces get you thinking and talking about a wide range of super-curricular topics...

Mr Harris

THE ARTS

To what extent do world leaders have the power to shape global events?

By Avery S

World leaders may appear to hold all the power when it comes to influencing global events. This can be seen in their summits and speeches, presented on the world stage under the full glare of the media – but how much power do they actually have? It is true that being Head of State, whether elected or imposed, affords power. Firstly, leaders have the ear of other Heads of State, which allows them to negotiate, apply pressure and champion their country's agenda through direct conversation. Furthermore, they have the full attention of the international press and can therefore wield that power to communicate and influence public opinion. In contrast, it could be argued that the power world leaders hold is dependent, to a certain degree, on external factors. Leaders do not exist in a vacuum. They must cooperate with other governments and organisations to get major decisions made, especially concerning international agreements and treaties. In addition, in democratic nations, the electorate have the ability to remove world leaders from office, or reduce their power, if they make unpopular decisions. Having considered both of these arguments, this essay will argue that to a large extent, world leaders do have the power to shape global events, but it is also important to acknowledge that not all influence lies with these leaders as individuals.

There is a range of convincing evidence that argues that world leaders do not hold the majority of the power needed to influence global affairs. Firstly, in free democratic countries, with the leader having been elected, a political mandate is given directly from the public to their chosen leader to govern their country. The electorate choose to put their faith in this figurehead to guide them towards prosperity, and make the often difficult decisions they see as the best fit for ensuring the nation is economically, socially and politically stable. This power, whilst vital, is easily lost. Democracies centre around one main authority – not the leader of the country, but the electorate themselves. The word 'democracy' literally means 'ruled by the people', deriving from the Greek words 'demos' (people) and 'kratia' (rule by), highlighting the importance of the power of the people over the leader[1]. The electorate, just as they put a leader in power, can remove them through voting them out via elections. One example is the power American voters have during midterm elections to reduce a leader's strength of influence within Congress.

The issue of the 2026 midterms is coming under great speculation as to the results they will bring for President Donald Trump, as historically, these elections have caused pivotal shifts in power, with 'the party of the incumbent president often being handed a sound defeat'[2]. Arguably, a lot of the power lies with the public opinion, and leaders have to take this into account when dealing with issues such as foreign policy and international relations and be careful in how they deal with global affairs.

Furthermore, a leader's power over global affairs could be reduced due to them having to comply with fellow world leaders and organisations they are allied with. The head of a country cannot make decisions individually concerning international relations without considering the interests of the organisations they are a part of, such as NATO or the United Nations, or they are at risk of becoming diplomatically isolated. This cooperation between nations is known as 'multilateralism' or the 'multilateral system'. It has been defined by the UN as 'a collective action coordinated between at least three actors' that 'emphasizes the importance of inclusive decision-making processes and shared responsibility in addressing international issues' and 'implies that the actors have a shared realization that it is in their interests to work together to resolve problems that are bigger than their individual efforts could tackle'[3]. This clearly displays a need for collaboration in making considered and rational decisions, and highlights how there is far more strength in working together to solve international issues than having a divided world stage. An individual leader who goes against this united system would be reducing their power further, by losing the support and cooperation of not just one country but an entire assembly of nations, ultimately leading to them being unable to hold influence in major international decisions. A leader may hold some power on their own, but

[1] https://www.parliament.uk/globalassets/about-parliament/how-parliament-works/accessible-resources/how-it-works-e-text-accessible.pdf (Accessed 14/12/25)

[2] https://www.britannica.com/topic/midterm-election (Accessed 19/01/26)

[3] https://www.un.org/en/global-issues/multilateral-system (Accessed 27/01/26)

without the advocacy of other nations, a leader can only do so much to shape global events.

Both the arguments above, whilst valid, contain several flaws in their reasoning. Firstly, the democratic mandate given by the electorate can indeed be removed, but almost never instantaneously, and the leader often has time, depending on the given term allowed in office, to either win back public opinion or simply go through with their policies without having to deal with any immediate consequences. Some leaders have been known to override public and even political opinion by using emergency powers to pass policy or actions with limited restrictions, most recently seen with President Trump's use of emergency powers to impose extortionate tariffs upon other countries, revealing a dangerous loophole in what was once one of the most solid democracies on the planet. Furthermore, diplomatic cooperation arguably also has its limitations, and any disagreements between leaders can lead to sluggish policy agreements and eventual deadlock, resulting in a delay in taking action. This highlights the power that individual leaders have to set a single-minded approach and follow it through.

It can be therefore argued far more convincingly that the role of the individual has become more influential in modern-day politics. The 21st century has so far proved to be a uniquely turbulent period, with many of the political norms established between democratic and undemocratic nations seemingly swept aside. This has become apparent 'since Vladimir Putin's rise to power in Russia', at a time when 'authoritarian leaders have come to dominate global politics'[4]. Both the press and academic institutions alike assert that 'a new era of strongman rulers is upon us', with the likes of Trump, Putin, Netanyahu, Xi and many European leaders dominating the world stage[5]. We have returned to political strategy reminiscent of the big personalities thrown together during the Cold War, where direct contact and summits between the 'superpower' leaders were vital in determining foreign policy. To many, this is an unwelcome return, with the whims of individuals seemingly now determining global affairs. With the Heads of State gaining more personal power, countries are having to appeal to the leaders themselves, rather than the collective government, making international diplomacy more challenging, and in-person summits even more essential in settling disputes and improving relations. This can be shown after the Russia-Ukraine peace talks in December 2025, where the Secretary General of NATO Mark Rutte said that "there is only one person" in the whole world who is able to break the deadlock when it comes to the war in Ukraine, and that is Donald Trump[6]. Rutte's comments emphasise the essential role of 'superpower' leaders to influence global affairs at present. Rutte may be referring here to the use of both soft power and strong man power. Soft power is a diplomatic strategy used by governments for building personal relationships with leaders. Strong man power, which relies on pressure and even threat, is the opposite of soft power, which offers access, friendship and collaboration. Soft power now is being used intermittently as part of strong man tactics in a kind of 'stick and carrot' behaviour of offering and withdrawing cooperation.

World leaders can further influence global events due to the power they wield from constant media attention. This has shown to be both useful in getting messages and policies across to the public and other world leaders, but also in potentially spreading misinformation, propaganda and the increasingly politicised idea of 'fake news'[7]. On the more positive side, it has been argued that 'social media has become a crucial tool for diplomats and world leaders to communicate directly with the public, both domestically and internationally, bypassing traditional media filters'[8]. This direct communication allows for leaders to control the narrative concerning what information is made public and how certain events are perceived. However, when this power is used the wrong way, it can lead to widespread misinformation and negative agendas that impact entire nations. Leaders can use media outlets to shape what they want their citizens and other countries to believe, by 'demonizing adversaries' and 'amplifying stereotypes', 'thereby fuelling nationalistic fervour and public support for war'[9]. Once in office, a Head of State instantly commands the attention of every media outlet in the world, and how they wield this power can heavily influence the views and agendas of both their own and other countries, and have a major impact on foreign relations.

These arguments are particularly convincing. We are undoubtedly seeing a return to big political figures dominating the world stage, with diplomatic cooperation hinging more on appeasing the individual leaders themselves and cultivating personal alliances rather than political ones. The role of the individual appears to be overtaking the importance of international alliances, and we are yet to see the long-term consequences of this. In addition, this emphasis on the individual is being further highlighted by role of the media, especially as social media is being more frequently used by political figures as individuals. Leaders seem to be focusing more on aspiring to likeability with the public, with their personal messages carrying more weight than their political promises.

In conclusion, it can be confidently argued that individual world leaders, to a large extent, have the power to shape global events. It must be acknowledged that the counter arguments do hold some credit, with restrictions on the leaders of democratic countries ensuring accountability and placing a restraint on government actions concerning foreign policy. Alliances with international organisations, equally, try to ensure a sense of accountability, championing honest partnership and peaceful cooperation when dealing with sensitive global

[4] https://www.oxfordmartin.ox.ac.uk/videos/age-of-the-strongman (Accessed 27/01/26)
[5] https://www.nytimes.com/2025/10/28/opinion/us-china-strongmen.html (27/01/26)
[6] https://www.bbc.co.uk/news/live/cwypq7xjvdqt?page=3 (Accessed 21/12/25)
[7] https://www.socialsciencejournal.in/assets/archives/2025/vol11issue4/11077.pdf (Accessed 20/01/26)
[8] https://www.socialsciencejournal.in/assets/archives/2025/vol11issue4/11077.pdf (Accessed 20/01/26)
[9] https://www.socialsciencejournal.in/assets/archives/2025/vol11issue4/11077.pdf (Accessed 20/01/26)

issues. However, as stated, the argument for individual power currently holds far more credibility. 'Strong man politics' is certainly rising to dominate the world stage, as we witness big personalities like Trump, Xi and various European leaders negotiate, but more often butt heads, over how global events should be settled. This emphasis on the individual has become even more apparent due to the power wielded by these leaders via use of the media, most notably on social media platforms, as they use these forums to get political and personal messages across. Despite this, regarding how the political atmosphere will change in the future, the only thing we can say with absolute certainty is that we cannot be certain. With the turbulent and unpredictable nature of 21st century politics, in ten years' time, who can say who will hold the power?

Is there such a thing as originality in modern society?

By Chloe B

There are convincing arguments surrounding the debate of whether original ideas are possible in modern society. For example, some may argue that there is still the possibility to have original ideas in modern society because whilst there might be space for repetition or copying of famous creations; artists interpret themes or prompts differently. By contrast, many people could argue that due to the recent creation of AI, such as ChatGPT and Gemini, there is no need for originality. This is because anyone can generate detailed ideas that can easily be recreated: Ai prompts and creations such as this kills the need for originality.

Ultimately, having reviewed the argument on both sides, this essay will further explore whether there is still the possibility for a concept like an original idea in modern society. The oxford English dictionary states that originality is the ability to think independently and creatively.[10] Clearly this disagrees with the possibility of originality in a modern society cluttered with plagiarism; however, is it that simple?

Some arguments for the possibility of original ideas are best argued by Roland Barthes and his 'Death of the Author' theory.[11] Barthes argues that a texts meaning isn't determined by the authors intent but instead by the readers interpretation. This implies that, whilst an author may repeat unoriginal ideas in their creations, everyone who reads, views or uses the idea turns it into an original idea in their own mind. Undoubtably Barthes theory is correct because everyone interprets text or art differently twisting the authors original idea to better fit their belief systems and personal experiences. Whilst society may argue that originality is dead as we see the repetition of ideas being implicated into different creations Barthes theory gives originality a new meaning from the Oxford dictionary. Originality is the way someone views or interprets a creation to fit their experiences.

Another example that could be made to support the concept of originality is the music industry. Since the beginning of humanity, we have been making and sharing music. If originality didn't exist then how are we are constantly seeing not only new songs but new forms of music? According to Wayne Chase's *How Music Really Works*, 'even though each type of

musical property (melody, harmony, rhythm) has a finite number of elements, when you multiply out all the combinations and permutations, you get a practically infinite number of possible songs a songwriter could write.'[12] Chase suggests that mathematically, originality within the music industry is possible. It's just a case of putting in the effort to develop that originality as a creative. Furthermore, as society discovered new instruments and cultures this infinity within music would grow because a C on an organ will sound very different to one played on a flute. So is the definition of originality not how its interpreted but rather a mathematical equation of different combinations of old ideas?

However, whilst there are strong arguments for the possibility of originality in modern society there are also those against the concept. For example, Mark Twain argues that there is no possibility for originality in modern society. In his BBC article he explains that we can turn old ideas into new, curious combinations, but they are still the same ideas even hundreds of years later.[13] Mark twain argues the point that the concept of originality isn't possible in modern society due to the constant influence of others on our creations. According to this view creatives often believe their ideas are original when their ideas are mistakenly repetition of popular concepts. As a society we are constantly absorbing different cultures, languages, traditions and other's experiences; so, we can't be inventors but rather recyclers of old thoughts. Considering this Twain suggests that complete originality isn't about thinking independently like the Oxford dictionary suggests. He instead argues that the idea of originality is an isolated idea free from repetition or

[10] original, adj. & n. meanings, etymology and more | Oxford English Dictionary
[11] The Death of the Author - Wikipedia
[12] Combinations, Permutations - How Many Possible Songs Are There?
[13] Is there such thing as an original idea? And how do you come up with one? - BBC

influence, therefore making it impossible for the concept of originality to exist in the modern day.

So, is the concept of originality an original idea or an overused motif that allows us as humans to feel in control of our lives, thoughts and actions?

To conclude, whilst the possibility of originality within modern society is argued differently by everyone, there is a clear and positive answer; original ideas are possible. Whilst you could argue that humanity has begun to be quite repetitive with our creations especially in the modern day, it doesn't mean that original ideas aren't possible. For example, like Barthes stated, originality is created not by the author but by the viewer. Everyone has different experiences and connotations of different colours, sounds and images, meaning every artwork or text is interpreted differently by every individual. Furthermore, as we have developed as a society and discovered new cultures and traditions, we have been able to combine different cultural ideas to form new original ideas, which as we learn more about each other will allow us to further develop new ideas.

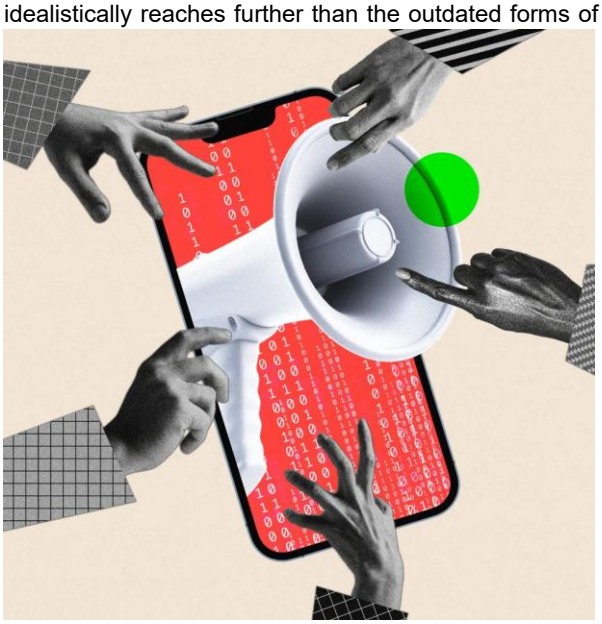
Finally, if you think about this question in terms of biology, every human is original, none the same as the last; yet we are all combinations of previously used facial features, hair textures, and eye colours. So, originality must be how, as inventors, we twist old ideas or features to create new improved concepts that appeal to everyone's unique experiences.

Has social media caused society to prioritize trends over meaningful issues?

By Saya S

Since the beginning of modern society, it is undeniable that we have changed with the emergence of social media. Where the origins of online communications can be traced back to the 1980s, social media was first seen to appear in 1997 with a profile uploading service.[14] After its initial appearance, social media continued to grow, and so did its usage- becoming an increasing problem and a form of addiction- strategically targeting our interests. We humans have developed a co-dependency to our social media platforms. In fact, this obsession is estimated to reach 6.05 billion users by 2028 (75% of the earth's total population)[15]. But the real issue, other than the billions fixed to their glowing screens, is that social media exposes us to ever-changing trends. These arguably consume our interests- unbeknownst to us, warping the reality in which we live. In a world where climate change and global politics have never been more significant, does social media restrict access to real coverage on such important messages? And yet, social media has so many positives and we humans have a notoriously bad habit of blaming others when things go wrong. The self-serving bias proves that when something negative occurs we blame it on external circumstances.[16] So perhaps, this demonisation of social media is another way for us to shift the blame from our shoulders. It makes you wonder- is social media corrupting us or are we corrupting it?

Some people would say that social media has created a new digital space to share information instead of restricting it. As more people refrain from reading them, there has been an evident decline in printed and digital newspapers.[17] In fact, with the birth of a generation that is exposed to digital devices at an early age, social media idealistically reaches further than the outdated forms of



news outlets. We can see this, as there is evidence that online sources remain popular with the younger age group, whilst traditional news sources stay the first choice for the older generation.[18] This leads to the idea that social media benefits us by being an accessible tool to spread information on global news. Many would claim that as the new generations grow, without social media, they would be ultimately avoid hearing about news at all. This said, there is evidence that younger people have been consuming more news sources than the older generation- only further proving that social media frequently allows people to be exposed to current affairs.[19]

When Jon Ronson said, "The great thing about social media was how it gave a voice to voiceless people." he

[14] (The Evolution of Social Media: How Did It Begin, and Where Could It Go Next? | Maryville Online)
[15] Social media - statistics & facts | Statista
[16] The Psychology of Blame: Understanding Deflected Responsibility

[17] News consumption in the UK 2024 report
[18] News consumption in the UK 2024 report
[19] News consumption in the UK 2024 report

was talking about how, at its best, social media removed traditional gatekeepers.[20] Before platforms like Instagram, Twitter or Reddit, it was incredibly difficult to spread your message to the public- the world often overshadowed the needy and undoubtedly ignored their concerns. Public conversations where controlled and monitored by journalists, politicians, celebrities and large institutions. With its growth over the years, social media let ordinary people- especially those from marginalised or ignored communities- speak directly, share lived experiences and speak without needing permission. This idea that social media allowed people to be heard is exactly why it is a misconception to refer to it as a brainwashing tool. Everyone has a right to an opinion; social media can amplify awareness and deliver judgement that hopefully leads to action. Sure, it also meant we focus on idle things like media trends but that stems from our constant need to be entertained- it isn't the fault of social media.

Even with this all considered, there are several people that continue to argue social media inhibits us from comprehending real world problems. For example, social media can be seen too often rewards what spreads fastest, not what matters most. This seemingly belittles the last argument, showing that platforms thrive off virality. As a result, voices can be heard but only if they adapt to trends or 'flashy' formats. This creates tension. On the one hand, social media empowers people; on the other hand, it pressures them to narrow their opinions into trending bites. Moral conversations turn into a performance. Due to this, people argue that the same system that gives voice to the voiceless also risks flattening those voices by pushing users to prioritise trends over depth. This results in visibility without understanding; voices are heard, but not always truly listened too.

Another reason social media is scrutinised is because of its role in advertising. People argue that it focuses on targeting consumers instead of heightening their ability to understand the social changes occurring globally. At its core, social media is a tool for making connections; moreover, it amplifies brand visibility and plays a significant role in marketing.[21] But because of this, we can often lose ourselves in the millions of businesses promoting themselves. Getting carried away by it is what leads to excessive use which steals our attention from more important matters- like the environmental state of our planet. Similarly, others argue that the way it personalises content means prominent issues aren't consumed through media. Our algorithms are reflective of what interests us, making it content that we want to engage with. Often, people refer to this as the Funhouse Mirror effect: algorithms prioritise engaging content, creating an "illusory norm" that is brought forward by a vocal minority.[22] As a result of this, we focus heavily on what is being shown to us, distorting reality and public opinion. This argues that what we think is directly linked to social media and that it in fact exposes us to a fake understanding of society- one that sugarcoats the global events. As we blindly follow what is being shown, we lose touch with each other and set our priorities on things that can fill the gap.

However, let's think about this. The Oxford dictionary officially defines social media as "Websites and software programs used for social networking."[23] When we look at it this way, some people would be right in arguing we prioritise it to communicate with others. That is exactly what it is used for so why wouldn't we use it as it is intended? Of course, as we continue to engage with it, it is only natural we grow accustomed to believing what it tells us. Perhaps, we do place what we see on social media highly. That's not the problem; we simply must learn to differentiate between fake and real news. This claim that social media has led us to prioritise trends over meaningful issues can therefore be disagreed with. It is unconvincing because it overlooks one key idea by interpreting it wrong. Where people argue that social media uses analytics to force us to see what we like, they forget that is exactly the point. Social media doesn't deny us of seeing a particular topic, it simply shows us what we *want* to see. The uses and gratification theory by Katz and Blumer argue that 'audiences deliberately choose specific media to satisfy needs'.[24]Therefore, reinstating that we actively choose media to fulfil specific needs. As individuals, if your interests lay away from politics or environmental welfare, why should you expect social media to constantly push out content directed towards those topics? How can we judge what is being shown to us when we are the ones actively looking for it?

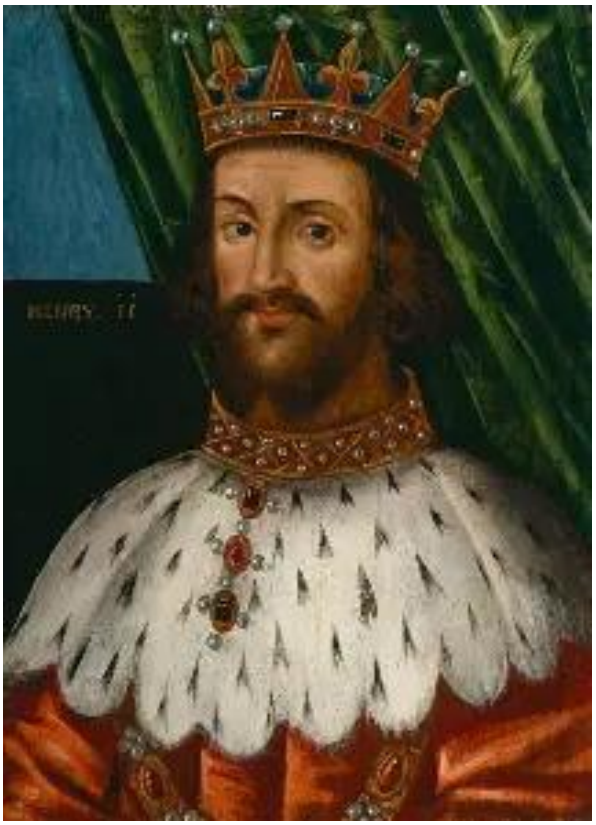
If we consider social media as a direct reflection of what we are as individuals, then it can't be blamed. It is therefore more convincing to argue social media does not influence us to prioritise trends. Instead, we all can choose what to hear and listen to as well as what we follow that up with. Truley, it is the concept of freewill that supports this: even with external influences, a person has the ability to choose their own actions.[25] Ultimately, social media isn't corrupting us, we are the ones corrupting it. Jet Bush said, "By blaming others, we fail to find the real solutions to our problems, and we do not carry out our own responsibilities."[26] So, if the root of this argument is that we are not prioritising the important things within society, then we can't blame that on social media. It is us that we must turn to fix the problem.

[20] "The great thing about social media was how it gave a voice to voiceless people"- Jon Ronson | NUHA Foundation
[21] The Power Of Social Media In Modern Marketing
[22] Inside the funhouse mirror factory: How social media distorts perceptions of norms - ScienceDirect
[23] social media noun - Definition, pictures, pronunciation and usage notes | Oxford Advanced Learner's Dictionary at OxfordLearnersDictionaries.com
[24] The Importance of Needs in Uses and Gratification Theory
[25] Free will - Wikipedia
[26] Jeb Bush quote: By blaming others, we fail to find the real solutions...

To what extent did French culture influence the Plantagenet era?

By Charlotte A

The House of Plantagenet originates in Anjou, a province in Northern France. The Battle of Hastings in 1066 resulted in William I, colloquially known as 'William the Conqueror', controlling the kingdom, originating from Normandy in France; after his grandson and heir to the throne's untimely death at the age of 17 during his son William II's reign, William's granddaughter Matilda was named inheritor, marrying a count from Anjou named Geoffrey IV. As a result of 'the Anarchy' – a civil war which lasted roughly 18 years – their son Henry II took the throne in 1154 marking the commence of the House of Plantagenet.[27] Henry's rule spanning 34 years set in stone the authority of his family over the kingdom of England, along with challenging the monarchy of France with his control over certain French regions. The relation of Plantagenet monarchs to Norman monarchs represented a link strengthened by French heritage, and it's clear that this French heritage had a significant effect on England. This article will argue that, whilst the French influence was undeniable within Anglo-Saxon customs consequently impacting the Plantagenet era, it resulted in more of an amalgamation of cultures rather than simply the erasure of one.



It is possible to say initially that there were instances where French culture did not have an impact on previous Anglo-Saxon ways. Unequivocally not to do with the strength of England's pre-conquest roots, there is the idea that regardless of the Norman Conquest in 1066 and the introduction of French customs and traditions, as well as the generalised concept that this would have impacted English culture substantially at the time, Anglo-Saxon heritage was more subject to the influence of Scandinavian culture than truthfully 'French' culture. Normandy is the region on the Northern coast of France, so whilst it makes sense to assume that its occupants would too be French, this is not fully the case; "The term 'Normans' ('men from the North') originally applied to the Scandinavian people who settled on that region in the IX and X centuries".[28] Therefore, to say that purely French culture had an impact on that of the English could be classed as untruthful, despite that this Scandinavian culture in Normandy would have over time mixed with that of the French enough to make an impact.

Another continuity of Anglo-Saxon culture in the Plantagenet era that persisted through the incoming wave of French culture is part of the language that we speak even now. The fact that the new language of England after the Norman conquest was called 'Anglo-Norman' and not simply 'Norman' showed a fusion of cultures, rather than the annihilation and replacement of one. The lower-class in society still spoke English, and the majority of people who had lived in England before the Norman invasion still might've used English when in the privacy of their own homes- Martin Aurell's book *The Plantagenet Empire 1154-1224* details how 'at the home of one of [Thomas Becket's] assassins, Hugh de Morville, his wife talked to him in English' yet 'the final argument between the archbishop and his murderers was conducted in French'.[29] This shows that Anglo-Saxon culture persisted through this French influence into the Plantagenet era, as despite the most frequently used language in society shifted to French, many maintained the use of their native tongue.

However, an instance where it becomes clear the impact that French culture had on Plantagenet England, as referenced previously, was the adaptation and societal position of language. Society quickly adapted so that soon the ability to speak in Latin and French became a tangible symbol of upper-class status. Post conquest, the language of the Norman invaders had become entwined with that of the Anglo-Saxons, creating a new language which became an indicator of the social hierarchy. The language that once had been widely spoken by the Anglo-Saxons was "demoted to a lower level, becoming a day-to-day language, the tongue of the hearth and the servants' quarters", representative of the view that the Normans had of the former inhabitants of England and the forcing of Anglo-Saxons to accept

[27] House of Plantagenet | History, Family Tree & Monarchs | Study.com (accessed on 27/11/25)

[28] Cristina Mouron Figueroa & Carlos Valcarcel Riveiro *The notation of nasal diphthongization (aun, oun) within the sociolinguistic context of Plantagenet England,* 2001 (acc. on 01/12/25)

[29] Martin Aurell (translated from the French by David Crouch) *The Plantagenet Empire 1154-1224,* 2007 (acc. on 01/02/26)

subordinate roles under Normans.[30] "In Britain, Anglo-Norman (the French dialect spoken on either side of the Channel) became the language of the social elite after the Conquest of 1066, which had extinguished or marginalised the native aristocracy speaking Anglo-Saxon (at that time, Middle English)", depicting the generalised shift in the language spoken by the "nobles, clergy and jongleurs of England".[31] Not only did the evolution of language from Anglo-Saxon to Anglo-Norman represent higher status in society, but also was "the language of king and court... which assisted careers and social climbing".[32] Therefore, whilst there was still somewhat a continuity of the Anglo-Saxon language through to the Plantagenet era, it was significantly impacted and degraded by the language of the Normans to a degree that cannot be overlooked.

Another core difference between the Anglo-Saxon and Norman cultures was the treatment of women. In the Anglo-Saxon period, "men and women lived on terms of 'rough equality'".[33] The medieval church was often believed to have been compliant with unconscious female stereotyping, however in a publication by Marc Meyer, a historian focusing primarily on the medieval period, he describes that these unintentional contemporary biases didn't reflect "a concerted effort and deliberate attempt to supress women", rather remove "ambiguities surrounding the role and status of women in the family and society".[34] It was also a right for Anglo-Saxon women to have the ability to "receive and dispose of land in their own right".[35]

Similarly, in the upper classes during the Plantagenet period, an idea prominent in literature emerged of 'chivalry', in which "the strong (the rightful elite in society) would beneficently protect the weaker sex", that 'weaker sex' of course meaning women, as "the twelfth commandment would mandate good behaviour towards women in particular".[36] This shows an impact from French culture due to chivalry stemming from the French term 'chevalerie' meaning knighthood. However, whilst the most elite women in society had the ability to accumulate vast amounts of power, the overall position of Plantagenet women was lesser than before. Where women could previously obtain and hold land on their own, Plantagenet women were now reduced simply to their union with their husbands, with coverture becoming an accepted practice. Land was to be juggled around the female so that only the men around her could be in ownership of what should have been hers- Morris Arnold's essays in honour of Samuel E Thorne describe a situation in which a military tenant dies leaving only an infant daughter as heir to some land, however instead of handing the land to the heir when she comes of age as what would have happened in the case of a male heir, "what [the lord] should do when she comes of age is arrange a marriage for her; and then he will deliver land with daughter to the husband".[37]

In conclusion, French culture did have a clear and indisputable persuasion on Anglo-Saxon traditions and culture. The Norman conquest introducing the French culture that soon integrated into that of the English signified a move to a more refined and reformed society, which continued very evidently into the Plantagenet kingdom. The point of language being adapted around the new Norman aristocracy to form Anglo-Norman is particularly strong in demonstrating a clear influence of culture in the Plantagenet era, and this change in language is still rooted in the language of today, used in things such as heraldry. Anglo-Saxon culture was not eradicated- roots of the original Anglo-Saxon language remained present post-Conquest, as well as fundamental structures in society staying relatively similar as before the invasion, however the Normans added and shaped culture in a way that persisted into the Plantagenet era.

[30] Martin Aurell (translated from the French by David Crouch) *The Plantagenet Empire 1154-1224,* 2007 (acc. on 24/01/26)
[31] Martin Aurell (translated from the French by David Crouch) *The Plantagenet Empire 1154-1224,* 2007 (acc. on 24/01/26)
[32] Martin Aurell (translated from the French by David Crouch) *The Plantagenet Empire 1154-1224,* 2007 (acc. on 24/01/26)
[33] Marc A. Meyer *Early Anglo-Saxon Penitentials and the Position of Women,* 1990 (acc. on 13/12/25)
[34] Marc A. Meyer *Early Anglo-Saxon Penitentials and the Position of Women,* 1990 (acc. on 13/12/25)
[35] Anne L Klinck *Anglo-Saxon Women and the Law,* 1982 (acc. on 13/12/25)
[36] Richard W Kaeuper *Medieval Chivalry,* 2016 (acc. on 01/01/26)
[37] Morris S Arnold *On the Laws and Customs of England: Essays in Honor of Samuel E Thorne,* 1981 (acc. on 01/01/26)

Is migration beneficial to the UK economy and workforce?

By Alex M

Immigration brings important economic and social benefits to the UK, but it also creates some short-term challenges. A rapid increase in labour supply can temporarily lower GDP per capita if capital and infrastructure do not adjust quickly, particularly when many newcomers are low-skilled or not immediately active in starting work. Sudden inflows may also place pressure on public services; this helps explain why immigration has become a top political concern for many citizens in the UK and why a party like Reform is doing so well in opinion polls. However, evidence shows that long-term strain on areas such as housing and healthcare is limited. Fiscal impacts also vary work-related migrants tend to make a positive contribution, while refugees often require more support. Crucially, if the UK adopted a more restrictive system like that of the United States, many public services could struggle, given how heavily the UK relies on migrant labour. This article will present the ideas of needing immigration as, without it, the UK would not be able to survive. However, it will also include the need for limitations on immigration as without these we would eventually be unable to handle the amount of citizens putting such a large strain on the public services that hold up the UK.

Firstly, as stated in the introduction, there are some powerful arguments against immigration and how it may be a drawback to the UK economy. Firstly, in a report from the Bank of England they found that the immigrant to native ratio has a small impact on the average person's wage in Britain, this suggests that immigration can take a small amount of money out of the averages worker's pocket . Many citizens can take information like this to try and put the economic downfall's blame on immigrants; this topic has been heavily politicized, and many people use it to scapegoat many bigger issues that may be causing this problem. However, by giving evidence that immigration does in fact take away small amounts of income from UK citizens is suggested that on those who work jobs in the UK, immigration may have a direct negative impact that they are easily able to see yearly through figures.

Secondly, the government have been trying to tackle the problem of rising unemployment from mid 2022 since the pandemic began, as a percentage 5.0% of citizens that are able to work are not currently in employment, this is a 0.3% rise since the previous quarter and a 0.7% since the same time last year. Many times, we may hear that people are blaming the lack of jobs on immigration, whilst immigration does fill gaps in needed sectors like the NHS the Migration Advisory Committee has noted that immigration can increase competition in specific labour markets, particularly in hospitality, food processing and warehousing . This is a direct drawback to the citizens who would be looking to be employed but are unable to seek a job, through rough statistics it is estimated that around 1.8million people are unemployed and currently seeking work, is this due to immigration or other factors that may be leading to UK citizens being unable to find

jobs. Furthermore, in the UK there are estimated to be 1.7million citizens that are claiming Jobseekers allowance (JSA) or Universal credit (UC) with a requirement searching for employment this demonstrates that the government will be funding this mass unemployment with tax payers money and they may have to return to austerity or have to tax even further than the already progressive movement of freezing income-tax thresholds .

Furthermore, In locations where the population density has largely increased due to migration it is able to put a large surge of demand on the public services due to healthcare and criminal issues, this not only makes waiting lists longer but also increases the spending needed in the public sector as the surge in demand causes more appointments as we would not be able to handle the surge with the amount of appointments that were currently in circulation, thus leading to the government using more taxpayers money to pay for those people coming into the country and brining longer wating lists. For example, that the government may have put towards these certain sectors

On the other hand, many sources state that immigration is a direct benefit as the Migration Advisory Committee produced an annual report in 2024 showing that migrants in fact have a net fiscal contribution of +£16,300 this clearly shows the positive impact of migration as this is a lot more money than the positive net fiscal contribution of an English born native as they only have a total of +£800. Furthermore, in that report it was also stated that the average "skilled worker" household had a positive net fiscal contribution of +£12000 whilst the average native UK household only had a +4000 these figures produced by the Migration Advisory Committee confidently show that migrants out pay the benefits they may receive from the government . When migration is publicly talked

about on national sources many paint it in such a bad light but do not reference such figures as without migration it is said that the GDP of the UK would decline by a rough estimate of 2% (£50-60 billion). This money not only would be vital to the UK, but it is proof that immigrants help our economy and don't hinder it.

Another reason why migration is crucial to the success of the UK is because in recent years employers in sectors like agriculture, Retail and the NHS has been finding it hard to secure enough workers purely on the domestic labour market alone, this is often due to skill shortages, unsociable hours or a very rapid growth in demand for workers or even natives not wanting to work for lower wages due to the cost of living in the current time period. This is solved and gaps are filled by migrants who are willing to work for that lower wage or have the skill set that is needed for a certain job role this helps to build the certain bridges need that are not already accessible in the native workforce. As these gaps are filled it means that these sectors do not have to slow down and they can keep fuelling the UK's economic growth that may otherwise not grow as quickly, not only does this benefit employers as they do not have to spend time and money on finding workers but it also supports our country. This has been stated by many sources one of them being the UK migration observatory and they support the need for migrants showing how migrants are helpful as they fill empty gaps in the workforce.

In conclusion, migration is important to the UK and remains a key part of its economic and social framework. Evidence clearly shows that migrants, especially skilled workers, significantly contribute to public finances, support GDP growth, and help fill essential labour shortages in sectors like the NHS, agriculture, and retail. Without migration, the UK would find it hard to maintain public services, support an aging population, and meet labour market needs. However, this does not mean that unlimited or open borders would work economically. Rapid and unmanaged inflows can put immediate pressure on wages, job competition, housing, and public services, especially when infrastructure and resources do not adjust quickly. Therefore, while migration is essential for the UK's long-term success, it must be guided by strict and carefully designed rules that emphasize economic contributions, integration, and planning. A balanced approach that acknowledges both the importance of migration and the limit of public service is vital to ensure that immigration continues to benefit the UK without overwhelming the systems that support its people.

In conclusion, migration plays a vital part of the UK's economy and social culture. Evidence clearly shows that migrants (particularly skilled workers) make significant contributions to public finances, support GDP growth, and fill essential labour shortages in key sectors such as the NHS, agriculture, and retail. Without migration, the UK would struggle to maintain public services, whilst support an ageing population, and meet the demands of its labour market. However, this does not mean that unrestricted or open borders are economically justifiable, and they would need to be heavily monitored. Rapid and poorly managed inflows can place short-term pressure on wages, job competition, housing, and public services, especially when infrastructure fails to adjust at the same pace. Therefore, while migration is crucial to the UK's long-term success, it must be managed through clear and carefully designed policies that prioritise economic benefits and an amount of migration that helps the UK, it would need effective planning. A balanced approach that recognises both the benefits of migration, and the limit of public service is essential to ensure immigration continues to strengthen the UK rather than strain it which could ultimately make migration a drawback to the UK.

To what extent is social media responsible for poor mental health in the 21st century?

By Maja O

There are strong arguments for and against social media's responsibility for poor mental health. Psychologists, for example, will point to the effect of filters used by popular influencers and AI content on body image and how younger people act due to what they have witnessed online. By contrast, some sociologists argue that social media helps to connect people and create communities to help people feel less alone – especially during times like lockdown and when the coronavirus pandemic hit the world. Ultimately, having reviewed the arguments on both sides, this essay will argue that social media has a large impact on poor mental health in the 20th century, but should not be considered completely responsible due to its undeniable benefits when used correctly.

As stated, there are some powerful arguments that portray the positive impacts of social media. For example, when the global pandemic of covid 19 hit the world, social media acted as a source of comfort and community to its users.[38] Popularity of media sites such as Twitter (now called X) helped to spread valuable health and safety information between its users, which formed communities that made people feel less lonely and helped them to be safer and more prepared during a difficult time. This was further reinforced by the fact that users could interact with posts and clarify information rather than just absorb what they were told without feeling heard as they would traditionally by just listening to the news. Secondly, the use of social media can help strengthen friendships and social connections which are vital in preserving our mental health.[39] This in turn benefits our physical health as many research studies and health professionals have stated due to factors such as hormones and stress which, when reduced, boost our immunity and motivation to build healthy habits and live better overall. To expand on this, the Oxford Saïd study conclusions state that platforms that genuinely promote social interactions rather than just 'mindless scrolling' can have a "detectable, albeit small, positive effect on a person's psychological wellbeing", supporting the argument that social media increases communication between people to form more positive relations.[40] Furthermore, another study shows that since 2009, blogs and other sources on social media have become more reliable when it came to obtaining health information, especially in communities that had taken a longer time to establish themselves. Some medical professionals such as physicians, being aware that social media usage is ever increasing, believe that meaningful use of social media platforms can relieve symptoms of depression, while also acting as a helpful source of laughter and relief for patients experiencing cancer or other rare diseases.[41]

However, despite the seemingly convincing nature of these arguments, there are several flaws in the reasoning. For example, the argument about the benefits of social media during times when social interactions are limited is flawed as it is not still relevant to the society we experience in 2026. At the time of writing this essay, it has been three years since the World Health Organisation declared an end to the public health emergency, so one could argue that we have returned to a pre-covid 19 society when concerning the topic of socialisation.[42] Therefore, social media may now be a counter-productive use of time as we are now able to leave our houses and socialise in person again, so the ever-increasing use of social media may actually be acting as a social barrier now, rather than aid in the development of connections with others. Similarly, the argument about blogs having significant benefits and relevant information concerning healthcare may not have originated from a reliable source. While the information comes from a journal published by three authors from the College of Public Health and Health Informatics and the University of Victoria, it was published in 2014 when artificial intelligence and fake news were not as large of

[38] 1752719911829.pdf *A. Verner Venegas-Vera, Gates B Colbert and Edgar V. Lerma* Published in 2020 p. 5. (accessed 27th November 2025)

[39] Effects-of-Social-Media-on-Mental-Health-A-Review.pdf *Hilal Bashir and Shabir Bhat* Published in 2017 p. 128. (accessed 14th December 2025)

[40] Social media can have positive effect on wellbeing, Oxford Saïd study finds | Saïd Business School *University of Oxford, Saïd Business School News*. Released in 2020 (accessed 16th January 2026)

[41] https://journals.sagepub.com/doi/full/10.1177/1460458213476969 *Mowafa Househ, Elizabeth Borycki and Andre Kushniruk* Published in 2014. pp. 50-8. (accessed 16th January 2026)

[42] HSR2-6-e1544.pdf *Rapty Sarker, A S M Roknuzzaman, Nazmunnahar, Mohammad Shahriar, Md Jamal Hossain and Md Rabiul Islam* Published in 2023 p. 1. (accessed 17th January 2026)

an issue as they are considered today. Therefore, the argument could be seen as weak because – although it was published by a reliable source from multiple accredited people – it isn't relevant to today's society where one of the most prominent issues associated with social media and the use of the internet in general is artificial intelligence, with one source even calling it a 'digital chameleon' due to its nature of being almost undetectable in some cases and fooling regular media users into spending money on products that aren't healthy and even spreading misinformation which has led to some fatal consequences.[43]

It is therefore more convincing to argue that social media is a largely responsible source for poor mental health – especially in teenagers whose frontal lobes are not yet fully developed. Firstly, December 2025 saw the introduction of the first social media ban for under 16's. Australia's government, potentially controversially, banned apps such as Instagram, Snapchat and TikTok which are currently widely used among teens.[44] To enforce this ban, the government has ensured that these social media companies will face fines of up to 49.5 million Australian dollars (equivalent to 25094842 GBP) if this agreement is repeatedly broken or children report encountering harmful content. Despite criticisms of this ban, many parents and teachers alike agree that this is the best solution so far due to the extent of the increase in social media usage on platforms such as YouTube and TikTok since they were first introduced in 2005 and 2016 respectively.[45] Furthermore, studies show that 11% of youth have experienced unwanted sexual content online which has been proven to increase the risk of depression, self-harm and suicidal behaviour – all of this in children under the age of 16[46]. Secondly, the results of a research experiment conducted in the UK and Canada suggest that social media has a detrimental effect on young people. Four of the high-quality studies found that common usage of the media among people who intentionally harm themselves can create isolation as they engage in content that normalises and even encourages deliberate self-harm and suicidal acts.[47] The researchers focused on interactions on YouTube, which is generally considered safer and more filtered than apps such as TikTok or Snapchat. The NSPCC states that it is much easier to come across harmful or upsetting content on TikTok than YouTube, reporting that unlike the latter, there is not a separate app specifically designed for children with much more filtered content and safety features designed for parents to help keep their children safer online.[48] Therefore, this creates a clearer picture of the potential harm that children are likely to experience on the common platforms that most teens use daily. Finally, there are direct links between social media usage and lack of sleep. An eight-year study looking into the effects of social media on mental health found that the use of platforms such as Facebook and Instagram replaced many of the 8-10 hours of sleep that adolescents need each night.[49] This was shown to directly affect their mood, anxiety levels and depressive symptoms. A similar study published in 2021 in the USA reported that after the increase in social media use since 2008, the number of people who have reported experiencing a major depressive episode[50] had increased by 83% by 2018 – and this was before the coronavirus pandemic when this usage became more normalised and common by over half the world's population (4.3 billion people).

The arguments presented here are particularly convincing. For example, the argument about the social media ban in Australia is very externally valid as it is both relevant to today's society (due to its recent introduction in 2025) and is influencing other countries to do the same due to its vast success. This argument is particularly convincing because the UK is now considering implementing a similar ban here. According to multiple news sources[51], on the 21st of January this year, the House of Lords almost unanimously voted for a social media ban to be put in place, meaning the debate has now been passed through to the House of Commons and is likely to soon become the law. This shows that despite, the ban in Australia not having a 100% success rate, the majority of youth has benefitted from this drastic change in their lifestyle, with one teen even reporting that despite the initial difficulty, "the presence of the ban has encouraged me to engage in more solitary activities and hobbies, such as crocheting, studying and exercising,

[43] https://www.iiis.org/CDs2023/CD2023Summer/papers/HA408FU.pdf *Louis Rosenberg* Published in 2023 p. 166. (accessed 17th January 2026)
https://www.euronews.com/next/2023/03/31/man-ends-his-life-after-an-ai-chatbot-encouraged-him-to-sacrifice-himself-to-stop-climate- *Imane El Atillah* Published in 2023 (accessed 17th January 2026)

[44] https://www.bbc.co.uk/news/articles/cwyp9d3ddqyo *BBC News*. Updated in 2026 (accessed 24th January 2026)

[45] https://journals.sagepub.com/doi/epub/10.1177/00048674241308692 *Julie A Blake, Andre Sourander, Akina Kato, and James G Scott* Published March 2025 Pp. 202-8. (accessed 25th January 2026)

[46] https://www.thelancet.com/action/showPdf?pii=S2589-7500%2825%2900024-X *Jasmine Fardouly*. Published in 2025 pp. 235-6 (accessed 25th January 2026)

[47] A Systematic Review of Social Media Use to Discuss and View Deliberate Self-Harm Acts
Michele P. Dyson, Lisa Hartling, Jocelyn Shulhan, Annabritt Chisholm, Andrea Milne, Purnima Sundar, Shannon D. Scott and Amanda S. Newton Published in 2016 p. 7. (accessed 25th January 2026)

[48] https://www.nspcc.org.uk/keeping-children-safe/online-safety/online-safety-blog/child-safe-settings-tiktok/ *NSPCC News* Published in 2022 (accessed 25th January 2026)
https://www.nspcc.org.uk/keeping-children-safe/online-safety/online-safety-blog/how-to-keep-your-child-safe-on-youtube/ *NSPCC News*. Published in 2022 (accessed 25th January 2026)

[49] https://scholarsarchive.byu.edu/cgi/viewcontent.cgi?article=5103&context=facpub *Sarah M. Coyne, Adam A. Rogers, Jessica D. Zurcher, Laura Stockdale and McCall Booth*. Published in 2019 p. 3. (accessed 25th January 2026)

[50] https://pubs.aeaweb.org/doi/pdfplus/10.1257/aer.20211218 *Luca Braghieri, Ro'ee Levy and Alexey Makarin* Published in 2022 p. 3661. (accessed 25th January 2026)

[51] https://news.sky.com/story/how-quickly-could-the-uk-ban-teenagers-from-social-media-13497587#:~:text=On%20Thursday%20night%2C%20the%20House,ban%20here%20in%20the%20UK. *Sky News* Published in 2026 (accessed 25th January 2026)
https://www.theguardian.com/uk-news/2026/jan/19/uk-ministers-launch-consultation-into-whether-to-ban-social-media-for-under-16s *The Guardian.* Published in 2026 (accessed 25th January 2026)

without procrastination"[52], showing the positivity this ban may encourage in the long term. Similarly, the argument about the positive correlation between depressive symptoms and social media usage is strong because there is such a vast quantity of sources which can support this. One source in particular could be found extremely intriguing as it explores the perspective of adolescents, a social group generally considered to use social media the most and display the negative consequences – usually without realising they are doing so. This source is powerful as the corresponding study provided teenagers with an environment in which they could express their educated opinions on how their media usage affected mental health. This experiment was conducted using six groups of secondary school students[53] who gathered to discuss the effects of excessive media usage – the majority of whom concluded they felt that 'social media posed a threat to their wellbeing'. This is further supported by UK statistics which suggest that 15% of 9–16-year-olds have been disturbed by online content with 28% of 11–16-year-olds reporting having specifically experienced an upsetting experience on social media. Again, the argument about direct links between social media usage and depression is powerful due to its relevance to today's society where 1 in 4 adults will experience a mental health problem each year[54] and because there are countless reliable sources online – with more being published and released on a daily basis. For instance, a journal published for King's College London (a UK university renowned for their health research and social sciences) recognises that of the 92% of teenagers[55] who use social media, most of them engage with it in a harmful way. This has the potential to compromise their lives through the features that make the media addictive – especially for young people who are considered old enough to take responsibility for their actions while also undergoing the process of puberty with underdeveloped frontal lobes (the feature of the brain responsible for decision making). Other sources[56] also inform us that the increase in adolescent depression and suicidal behaviour is largely connected to the usage of social media platforms to such an excess, stating in other words that the vast majority (85%, 72% and 69%) of teens use the platforms YouTube, Instagram and Snapchat respectively according to the Pew Research Centre and that 48% of these agree[57] that social media harms people their age.

In conclusion, it seems that social media can be held largely responsible for poor mental health in the 21st century. It must be acknowledged that our actions are governed by free will, so when we interact with these potentially harmful platforms, we do so with autonomy. Nothing can be completely responsible for a topic as variable as mental health and while we must consider that it has had positive consequences in the past (such as when the coronavirus pandemic took the world by storm), we must also see that platforms such as TikTok, Instagram and Snapchat have been specifically designed to ensure users spend an unreasonable amount of time using them. This outweighs the positive aspects by compromising their time, increasing stress and anxiety levels and ultimately acting as a catalyst for these incidents of poor mental health to occur, such as the increase from 5.6% since 2000 to 25% of adults and 10% of under16s reporting mental illness currently.[58] As young people encounter harmful content online at an increasing rate, it seems that we desperately need to input measures to lessen this constant use which clearly has such a significant effect.

[52] https://www.bbc.co.uk/news/articles/c0mpmgn3jv2o *BBC News*. Published in 2026 (accessed 25th January 2026)

[53]https://eprints.whiterose.ac.uk/id/eprint/136393/1/social%2BmediaMH%2BFINAL%2BCCPP%2BREVISED.pdf *Michelle O'Reilly, Nisha Dogra, Natasha Whiteman, Jason Hughes, Seyda Eruyar and Paul Reilly* Published in 2018. Pp. 7-9 (accessed 27th January 2026)

[54] https://www.priorygroup.com/mental-health/mental-health-statistics. *Priory*. Published in 2025 (last accessed 27th January 2026)

[55]https://www.tandfonline.com/doi/pdf/10.1080/02673843.2019.1590851. *Betul Keles, Niall McCrae and Annmarie Grealish*. Published in 2020 Pp. 2-3 (accessed 27th January 2026)

[56]https://pmc.ncbi.nlm.nih.gov/articles/PMC7392374/pdf/nihms-1602803.pdf *Carol Vidal, Tenzin Lhaksampa, Leslie Miller, Rheanna Platt* Published in 2020 Pp. 1-2 (accessed 27th January 2026)

[57]https://www.pewresearch.org/internet/2025/04/22/teens-social-media-and-mental-health/ *Michelle Faverio, Monica Anderson and Eugenie Park*. Published in 2025 (accessed 27th January 2026)

[58] Changes in depression, anxiety and stress over two decades | UCL Faculty of Brain Sciences *UCL Faculty News*. Published in 2023 (accessed 5th February 2026)

Should the voting age be lowered in the UK?

By George Q

The question of whether the voting age should be lowered in the UK has become a largely debated topic over the past few years. People in favour argue that 16- to 17-year-olds are well informed, politically aware and deserving of a voice in decisions that shape their future. The current Labour government are lowering the voting age to give 16- to 17-year-olds the right to vote at the next general election, showing this is a highly debated topic. However, others claim that younger people may lack the life experience and maturity needed to make sophisticated decisions. As issues affecting education, employment and climate change arise, the debate about lowering the voting age raises queries about fairness and fully representing the population. Ultimately, having reviewed the arguments on both sides, this essay will argue that the voting age should be lowered to allow younger people to have their say.

As stated, there are compelling arguments against lowering the voting age, keeping it at eighteen. Firstly, people who disagree may argue that sixteen to seventeen year olds lack the maturity to make wise decisions at the ballot box. Maturity involving sharp critical thinking skills and the understanding of long term consequences. They have simply not gained the level of life experience that an adult has obtained. What does a sixteen year old know about taxation and council laws? And this isn't saying that no 16 year olds are politically informed but voting laws must apply to the majority, not the exceptions. Secondly, people may believe that young people are too highly influenced by social media trends and high-status influencers. People of likes of Andrew Tate who portrays misogynistic, radicalistic views have deep roots in the minds of many teenagers[59]. These opinions are widely spread through social media algorithms that feed people what they want to hear and place them in echo chambers with people who reinforce their beliefs. Voting should be based on the critical evaluation of party's policies, not on emotional or viral content found online. Thirdly, many sixteen to seventeen year olds have not completed full civic education such as economics and social studies so they may not understand how democratic systems operate. Without this fundamental knowledge, their voting decisions may be based on surface level opinions rather than a deep understanding of how their decisions impact society.

However, despite the seemingly convincing nature of these arguments, there are several flaws in the reasoning. For example, the claim that sixteen to seventeen year olds lack maturity is harsh generalisation. Maturity is not determined purely by age. And obviously many adults also lack political knowledge and can make emotionally driven decisions. If maturity

was a strict requirement for voting, then many people over the age of eighteen would also be excluded from the process, which would undermine the supposed fairness of democracy. Similarly, the argument about the influence of social media is also flawed because the exposure to it is not limited to young people alone. Many adults are equally exposed to misinformation, hateful content and online echo chambers. Therefore, using the influence of social media to oppose young people the vote is flawed, as it does not account for the wider issue of social media as whole influencing all age groups. Furthermore, while it's true that most young people have not completed full civic education, this issue could be addressed by providing improved political education to school age children rather than denying them their say. Perhaps allowing young people to vote would encourage engagement in politics from a much younger age.

It is therefore more convincing to argue that the voting age should be lowered in the UK. Firstly, sixteen to seventeen year olds are already trusted with significant responsibilities that affect the wider society. At sixteen, young people can work, pay taxes and contribute to the economy, all while having no say in how those taxes are used. It can certainly be argued that if people are old enough to earn and be taxed, they should also be considered old enough to vote. Secondly, lowering the voting age could potentially increase long term political engagement. Research from Scottish elections show that people who were able to vote at sixteen or seventeen are more likely to keep voting into their twenties than those who first voted at eighteen or older[60]. Also allowing young people to vote while still being in education may also mean they are better informed and more likely to discuss political views in a safe

[59] Who is Andrew Tate? The self-proclaimed misogynist influencer
Published 27 February 2025 Who is Andrew Tate? The self-proclaimed misogynist influencer - BBC News

[60] Lowering voting age boosts long-term participation in elections 16 January 2023 Lowering voting age boosts long-term participation in elections | School of Social and Political Science

environment. Finally, young people are arguably going to be influenced the most by decisions made by the current government. They have no say in decisions that affect education, housing, climate change and employment which will all affect them the most in the future.

The arguments stated here are particularly convincing. For example, the fact that 16 year olds are allowed to work and pay taxes, just like adults, highlights a clear flaw in the fairness of democracy, and what it stands for. Is it really fair to be taxed, all while having no say to where the money goes and what it gets used for in the future? Also, allowing young people to work and pay taxes demonstrates that they are able to take on the same responsibilities as adults, so, therefore they should have the same rights. Rights should match responsibilities. Furthermore, evidence from The University of Edinburgh proves that beginning to vote at a younger age encourages lifelong political engagement, as seen in the Scottish elections. Also, many 16 to 17 year olds are still in school. This means first time voters are more supported than those who vote for the first time later without guidance. This suggests that lowering the voting age will benefit democracy rather than weaken it by developing more engaged and informed citizens.

In conclusion, lowering the voting age to sixteen would be a positive and beneficial change the democratic system. While it's true that that 16 and 17 year olds lack the same maturity as most adults, and they usually don't have the same level of political knowledge as somebody three times their age, but they already take on similar responsibilities to most adults, and are fully capable of making informed decisions at the ballot box. Arguably, children are going to be affected the most by decisions made by the current government in the long run so denying them the vote is hardly logical. So, allowing them to vote would make the system much more inclusive and representative of the population, in the way it was designed to be. Therefore, the voting age should be lowered to better reflect the views and rights of all people in society.

To what extent does literature play a decisive role in costume for theatre and film?

By Esmé D

This question sparks debate throughout theatre communities, as the literary influence of original texts via stage directions, authorial descriptions and contemporary contexts establishes how onstage productions should conduct aspects of costume and aesthetics. However, this contrasts heavily with modern and directorial interpretations of onstage adaptations as many productions offer alternative views and opinions, derived from modern events and cultural aspects of context, through the utilisation of costume. It is often argued literature provides decisive guidance for costume via textual detail, although many modernist critics would perceive new direction of costumes as creative visions overriding original textual descriptions, in order to pose a new message to modern audiences. However, after reviewing both opposing arguments, this essay will argue for the need for negotiation between the fidelity to literature cues and the desire for contemporary, interpretive adaptations to engage a modern audience, both are pivotal to the moral power of theatre in a modern society.

Whilst modern interpretations of costume design, in film and theatre, play a large role in framing allegories and moral teachings for a broader and more contemporary audience, many theorists would argue stage directions, character descriptions and textual context remain the driving forces for the creation of costume as a whole. For example, Shakespeare's use of contextual allusion,

concerning time periods and therefore costume, and inference developed into utilisation of costume to reference social class, deception and character identity, which has been honoured by many modern theatre companies and film production teams, as a means to directly integrate his moralities into a display for modern audiences to reflect upon. This is possibly best illustrated

via the RSC[61], whose costume production team remain loyal to Shakespeare's original descriptions and requests concerning costume and aesthetics, as seen in Gregory Doran's RSC production of 'King Lear'[62] in 2016. This is due to the RSC's "Shakespeare by design"[63] project, which specifically checks costumes against original archived materials, pieces and drawings to ensure accuracy, a crucial development within the company to assure the utmost fidelity to historical costume when producing traditional variations of Shakespearean texts. A purist who would argue for the continuity of traditional dress and costume in modern theatre and film would be Jenny Tarimani, A costume and stage designer (Who worked at Shakespeare's Globe Theatre) with multiple awards and other decorations. Tarimani advocates for the utilisation of historically accurate materials as well as hand stitching and cut as she argues that "Truth is getting as close to the historical detail as you can", Alluding to the enlightenment of theatre being at its most manipulative and affective on an audience when full original detail can penetrate the moralities, entailed within the play, into their minds. Perhaps a second example of where costume productions have remained loyal to the authors original intent and period of writing would perhaps be via Joe Wright's 2005 "Pride & Prejudice", a historically accurate interpretation of Jane Austen's[64] 1797 Novel 'Pride and Prejudice', Where traditional regency[65] dress was adhered to by production, aiding in the craft of a legitimate construction of Austen's original vision and moral teachings, allowing the audiences to fully appreciate her work and allegorical messages in their rawest form. Willow and Thatch period drama news and reviews blog stated that "In line with the Regency fondness for white or light-coloured gowns emulating ancient Greek and Roman statues, many of the young female characters wear white in the evening. Elizabeth [Bennet, main female heroine] is no exception"[66] . Fidelity to original scripture and literary cues is vital for the accurate recreation of historical and modern texts, in order for the full validity of the allegorical moral and teachings to be consumed in the desired format.

In contrast, many theorists might argue that modernising or interpreting costume to suit the ideas and concepts crafted by a director for a more modern audience is of a higher crucial importance than remaining loyal to the initial descriptions and cues posed by authorial creators of texts and plays that are being adapted for live theatre and film. This is perhaps best exemplified by the modern aim to make a movie or production marketable, most often this is carried out via the fashion and aesthetics of a production, for instance, in Baz Luhrman's 2013 production of 'The Great Gatsby' stylistic branding is a focus of the main character's fashion, with Prada and Brooks Brothers being directly referenced via the costumes. This signifies production opted to create a profitable and marketable campaign for the modern production over fidelity to Fitzgerald and his vital vision of how each character was to be perceived by an audience. In an article by Fashionista[67], Catherine Martin (Set designer and costumer for the production of the 2013 The Great Gatsby) exposed that many of the women's dresses were purposefully tighter and more revealing, lacking historical accuracy of the 1920s and encouraging the engagement of a male audience via Laura Mulvey's theory of the Male gaze[68] As well as this, Martin also revealed whilst authorial references were investigated, they weren't always adhered to and the time period of setting was used as a loose reference, however the time period entailed so many styles and fashion features that the film became an amalgamation of the 20's with modern editions to the overall style involved. This interesting take on the classic novel, through a Hollywood lens, allows audiences to appreciate how modern initiatives and creative ideas develop wider audiences and engage viewers to a higher depth opposed to the accurate and original reproductions that are offered elsewhere. A second possible reason to oppose the thesis, would be the practical and financial constraints posed by the industry, leading to the reshaping of costumes and other set aspects for the production to continue. This is highlighted by the 'Lord of The Rings' movies, originally written by J.R Tolkien, a fantasy trilogy, where world building and character aesthetics are pivotal in creating the desired story and realm in which it takes place. An article written by Upworthy[69] suggests the lack of budget for modern adaptations of books into films leads to a lack of authenticity, meaning productions must cut corners and reimagine costumes and other aesthetic details as a means of uplifting the overall quality of the text. This argument would suggest stylistic, practical and commercial decisions often influence costume beyond the confines of literary prescriptions and cues, making interpretation, among other factors, the decisive force for costume in theatre and film.

[61] Royal Shakespeare Company (Theatre production company who perform Shakespearean pieces) **https://www.rsc.org.uk/**

[62] A play written and originally produced by Shakespeare in 1605-1606 **https://www.rsc.org.uk/king-lear/past-productions/in-focus-gregory-doran-2016**

[63] **https://www.shakespeare.org.uk/explore-shakespeare/blogs/shakespeare-design-project-first-update/**

[64] A regency period, female author who became one of the bestselling authors of all time and was a pioneer for female empowerment and the future of women's roles in literature.

[65] A period in history between 1795 and 1837 https://wentworthwoodhouse.org.uk/discovery/a-walk-through-the-regency-era/

[66] Costuming Austen's Pride & Prejudice Article surrounding validity of historical accuracy in this adaptation of pride and prejudice as well as others.

[67] Article about costumes for 2013 rendition of The Great Gatsby Catherine Martin on Creating the Costumes for The Great Gatsby - Fashionista

[68] Male Gaze theory, Laura Mulvey Laura Mulvey, Visual Pleasure.pdf

[69] Upworthy article on industry budget and film quality Why costumes for streaming shows have dropped in quality - Upworthy

To synthesise these two binary opposites, concerning the question originally posed, theorists could consider how costume designers utilise texts as an initial idea for the composition of the final design, not as a blueprint. This allows audiences to appreciate the heritage of the character and costume, whilst experiencing a unique interpretation that, at points, aids in the modernisation of classical prose and play, leading to the easier digestion of allegories for modern audiences. According to Pamela Howard's book 'Scenography'[70], original texts offer themes, character cues and period markers, whilst costume designers are enabled to translate these crucial points of information through metaphors, contemporary aesthetics and practical needs. This theory allows for the production of costumes to carry forward the intended themes and characteristics of a character, such as social class, whilst also offering a refreshing and modern reading of the earlier text, in turn this theory aids in the engagement of viewers as it speaks to modern fashion as well as cultural and societal influences. A second possible point to aid in the synthesising of the two previous arguments would be that the most successful designs honour the texts whilst establishing a unique visual grammar, this is evident through the recent production of Margret Atwood's dystopian novel 'A Handmaid's Tale', where costume designer, Anne Crabtree uses colour to systematically reflect where society is stratified and controlled, leading to costume acting as a visual language, influenced by the original narrative text. Vogue published an article, where Crabtree stated that: "In Atwood's simplified universe, everyone was divided into controlled groups depending on their role. Each sub sector needed a uniform to overthrow any individuality, so colour was a very tribal way to identify this." Aside from the commanders, who are clad in black, a "mysterious, 'non' colour that powerfully absorbs all other colours".[71] Here, Crabtree alludes to her own creative prowess and ideas during this project, however, the costumer also makes it clear that Atwood's story line and oppressed societal narrative played a large role in the construction of the uniforms created for the film production. This synthesis of authorial prescription and individual creativity, by production, aids in the development of a symbiotic relationship between the creators of a story and its film adapters, as both propose ideas relating to the narrative and the external influences of Hollywood, therefore creating the best possible outcome for design on a set, to be able to abide by authorial texts and still appeal to modern audiences.

To conclude, the extent of literature's decisiveness on costume for theatre and film, I would like to assert that literature provides the conceptual and dramaturgical foundation for modern adaptations of prose and plays, whilst practice and production often showcase that interpretive, contextual and industrial factors redirect or expand upon initial narrative desires. Costume design is most fruitfully understood as a negotiation between the fidelity to literature, shaping possibility, and the actualities of productions, shaping stylistic interpretations that engage audiences to a greater, more creative level.

To what extent does the inevitability thesis distort our understanding of the English Civil War?

By Carmen H

There are strong arguments for and against the inevitability thesis in explaining the outbreak of the English Civil War. Proponents of the inevitability thesis argue that long-term structural tensions within English society. The religious division, constitutional conflict, and financial weakness of the Crown; meant that civil war was unavoidable by the early 1640s. From this perspective, the events of 1642 were simply the culmination of decades of mounting pressure. By contrast, critics of the inevitability thesis argue that the Civil War was not inevitable and that short-term factors, especially the actions and personality of Charles I and the crises of the early 1640s, were decisive in bringing about armed conflict.[72] Ultimately, having reviewed the arguments on both sides, this essay will argue that while the inevitability thesis highlights genuine long-term weaknesses within the English political system,

it significantly distorts our understanding of the English Civil War by underestimating contingency, political choice, and the importance of short-term causes.

As stated, there are some powerful arguments in favour of the inevitability thesis. Firstly, long-term religious divisions created persistent instability throughout the early seventeenth century. England remained deeply

[70] Book on Scenography Writer |Pamela Howard

[71] The Handmaid's Tale: How Costume Designer Ane Crabtree Dressed Margaret Atwood's Dystopia | British Vogue | British Vogue

[72] Charles I (r. 1625-1649) | The Royal Family

divided following the Reformation, with tensions between Puritans, Anglicans, and Catholics. These divisions were intensified under Charles I, whose support for Arminianism and perceived tolerance of Catholicism alarmed many Protestants.[73] Christopher Hill argues that religion was "a major source of conflict between Crown and Parliament" as fears grew that Charles was undermining the Protestant settlement.[74] The introduction of the new prayer book in Scotland and the influence of Archbishop Laud reinforced the belief that the Crown was imposing religious change without consent, making conflict appear increasingly likely.[75]

In addition, long-standing constitutional disputes strengthened the argument that war was inevitable. Parliament increasingly challenged what it saw as Charles's authoritarian style of rule, particularly during the period of Personal Rule between 1629 and 1640.[76] Measures such as forced loans, ship money, and the use of prerogative courts led many MPs to believe that the king was attempting to bypass parliamentary authority. "Two theories of government stood permanently opposed" arguing that by the early seventeenth century war was inevitable[77]. From this perspective, conflict between royal absolutism and parliamentary privilege was unavoidable.

Lastly, the Crown's financial weakness reinforced these tensions. Charles I's inability to raise sufficient revenue without Parliament severely limited his freedom of action. His failed military campaigns and the cost of the Bishops' Wars against Scotland forced him to recall Parliament in 1640, reopening unresolved grievances.[78] Hill suggests that these structural weaknesses within the political system made serious confrontation increasingly likely over time[79]. Taken together, religious division, constitutional conflict, and financial instability appear to support the inevitability thesis.

However, despite these arguments, there are significant flaws in the inevitability thesis. For example, the argument that long-term religious tension made war unavoidable is flawed because such divisions had existed for decades without leading to civil war. Elizabeth I and James I both governed a religiously divided nation yet avoided large-scale internal conflict. It can be argued that England, before 1640, was governed through a broad political consensus and that there was nothing inherently unstable about the political nation. He emphasises that the system only collapsed when trust between king and political elites broke down in the early 1640s.[80] This suggests that religious tension alone cannot explain why war broke out specifically in 1642 rather than earlier.

Similarly, the argument that constitutional conflict made war inevitable is weak because it assumes that disagreement must lead to violence. Parliament and monarch had clashed many times before, but some sort of compromise had usually been reached. Kevin Sharpe argues that early Stuart politics operated through what he describes as a "politics of consensus," in which disagreement was normally resolved through negotiation rather than conflict or confrontation. He emphasizes that Charles I's Personal Rule was not widely perceived as tyrannical at the time and did not make civil war inevitable.[81]

It is therefore more suitable to agree that that the English Civil War was not inevitable, but rather the result of short-term factors and individual decisions. Firstly, the personality and actions of Charles I played a central role in escalating tensions. Charles's strong belief in divine right, his refusal to compromise, and his tendency to break agreements undermined trust between Crown and Parliament.[82] It can be argued that the Civil War was the result of "a failure of political trust" rather than the collapse of the political system itself (Morrill, The Nature of the English Revolution).[83] Charles's inability to work constructively with Parliament transformed manageable disputes into existential crises.

Moreover, short-term crises in the early 1640s were decisive in triggering war. The Irish Rebellion of 1641 created widespread fear and panic within England, particularly due to exaggerated reports of Protestant massacres. The rebellion raised the urgent question of who should control the army raised to suppress it; Charles or Parliament. Sharpe identifies the crises of 1640 to 42, particularly fears generated by the Irish Rebellion, as the decisive turning point. He argues that these events transformed political disagreement into a struggle over sovereignty and control of armed force, a situation from which compromise became increasingly difficult[84].

Ultimately, the final breakdown of relations in 1642 demonstrates the importance of contingency. Charles's attempt to arrest the Five Members was a catastrophic misjudgement that destroyed any remaining trust. This action was not an inevitable outcome of long-term tension but a reckless decision that made war far more likely. The argument that even at this late stage "choices were narrowed but not eliminated" reinforcing the view

[73] Arminianism | Definition, Description, Beliefs, History, & Facts | Britannica
[74] Christopher Hill: The English Revolution 1640 (1940)
[75] The book of common prayer and administration of the sacraments and other parts of divine service for the use of the Church of Scotland : commonly known as Laud's liturgy (1637) : Church of Scotland : Free Download, Borrow, and Streaming : Internet Archive
[76] The Personal Rule of Charles I - UK Parliament
[77] History of the great civil war, 1642-1649 : Gardiner, Samuel Rawson, 1829-1902 : Free Download, Borrow, and Streaming : Internet Archive
[78] Bishops' Wars | Scottish, Covenanters, Charles I | Britannica
[79] Christopher Hill: The English Revolution 1640 (1940)
[80] The Personal Rule of Charles I - Kevin Sharpe - Google Books
[81] The Personal Rule of Charles I - Kevin Sharpe - Google Books
[82] Charles I (r. 1625-1649) | The Royal Family
[83] The Nature of the English Revolution - John Morrill - Google Books
[84] The Personal Rule of Charles I - Kevin Sharpe - Google Books

that war resulted from human agency rather than destiny[85].

Furthermore, the arguments opposing the inevitability thesis are particularly convincing because they better explain the timing of the war. For example, the argument that short-term factors caused the conflict is powerful because it explains why civil war broke out in 1642 rather than earlier. Structural tensions had existed for decades, yet war only occurred when immediate crises destabilised the political system. This interpretation is supported by the analysis of Sharpe in the years 1639 to 42, which emphasises the speed with which political cooperation collapsed and highlights how a system that had functioned effectively for decades unravelled in a matter of months.[86]

Similarly, the argument that human agency mattered is strong because it is based on close analysis of contemporary evidence. This emphasises long-term social and economic tensions, even he acknowledges the dramatic pace of change during the 1640s.[87] Hill describes how traditional political and social structures collapsed rapidly, suggesting that the Civil War represented a sudden transformation rather than the slow fulfilment of an inevitable process.[88] His description of a society in which "the world was turned upside down" highlights the speed and unpredictability of events.[89]

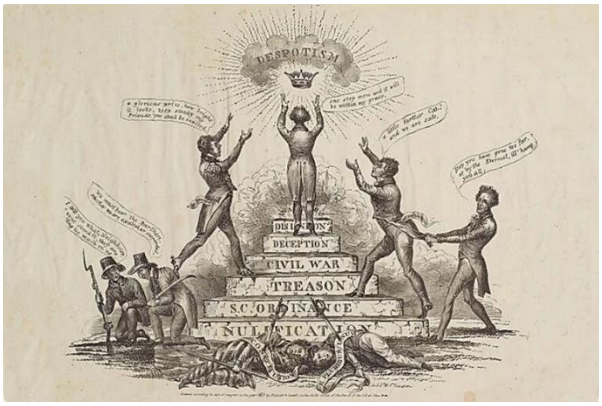
In conclusion, while the inevitability thesis draws attention to important long-term tensions within early modern England, it ultimately distorts our understanding of the English Civil War. Although religious division, constitutional conflict, and financial weakness created instability, they did not make the civil war unavoidable. This is due to the decisive role of short-term crises and the failure of political trust. The English Civil War was not the product of fate or historical destiny, but of choices made under pressure. History reminds us that what is chosen can never truly be inevitable. Furthermore, arguing that the English civil war was not inevitable.

Was slavery the main cause of the American Civil War?

By George C

The question of the extent to which the divisive issue of slavery was the predominant cause of the American Civil War has been the subject of much heated debate over several decades. 'Lost Cause' theorists in the Southern states assert that other societal, political and economic reasons caused the South to fight for their survival against the tyrannical North. On the contrary, arguments from the Northern states say that Southern statesmen themselves cited their right to own slaves as the deal breaker which led to secession in South Carolina and the first gunfire of war at Fort Sumter, April 12th,1861. This essay will endeavour to explore a range of issues that are relevant to the antebellum period and draw conclusions to whether slavery was the deciding trigger of the American Civil War.

The Civil War was almost inevitable. With the country's rapid development and population growth, opposing beliefs were bound to lead to a considerable disagreement only resolved by war. At the time of the outbreak of hostilities, America as an independent country was still in its infancy and only 84 years old. In fact, in 1854 Senator Stephen Douglas described the country as "This young giant".[90] When the United States declared independence from European colonies in 1776, the constitution was constructed and subsequently amended. There were 13 states originally, and by 1860, there were 20 more. Even more significant was the exponential population growth rate, starting with only 2.5 million citizens and reaching 31.5 million by 1860.[91] By



this time, the population which spanned thousands of miles had developed into an industrialised North and an agrarian South. This escalated the tensions further amongst the two sides, since a slave-dependent economy producing cotton, tobacco and sugar was the backbone of the South, whilst tariff production which occasionally harmed the South was crucial in the North for a successful industrial economy.

As mentioned above, the contrasting economies clearly put the Southern states in conflict with the North. By 1850, 90% of all manufacturing output came from the Northern states. [92] Whereas the Southern states relied heavily on agriculture, which was only feasible because of the near 4 million slaves in 1860, who were being depended upon to work tirelessly every day to maintain the economic situation of the South. Previous tensions occurred with the '1828 Tariff of Abominations' where the

[85] The Nature of the English Revolution - John Morrill - Google Books
[86] The Personal Rule of Charles I - Kevin Sharpe - Google Books
[87] Christopher Hill, The World Turned Upside Down
[88] Christopher Hill, The World Turned Upside Down
[89] Christopher Hill, The World Turned Upside Down

[90] https://www.senate.gov/artandhistory/history/minute/Kansas_Nebraska_Act.htm 1/2/26
[91] 1860 Census: Population of the United States https://share.google/I6JU2Es9QQb8gEjr1 8/2/26
[92] Arrington,B - 'The Civil War Remembered, Industry + Economy during the Civil War' page 104 8/2/26

federal government put a 50% tax on imports into the country.[93] In retaliation to the tariffs on their exports, Britain reduced their agricultural imports from the South. This impacted the South because they lost business in sales as well as Britain's goods becoming dearer because of the tariff. So, this resulted in a prospering North and a weakening and embittered South, adding to the imbalance and dispute between the two sides.

The largest area of conflict alongside slavery was between individual states and the federal government. Political leader John Calhoun - who coined the term 'Tariff of Abominations' - introduced his 'Doctrine of Nullification' in the 1830's, where states should have the right to deem any federal laws unconstitutional, and therefore nullify them.[94] So, in Calhoun's view, states should have had more sovereignty and be able to disregard the federal laws made in Congress if they considered them to be unjust. In 1832, after another damaging tariff for the Southern economy, South Carolina declared the tariff null and void, and threatened to leave the union. Andrew Jackson, the president at the time, introduced the Force Bill, granting the government the power to use military forces to compel a state to follow the law. He also stated in his Nullification Proclamation that only a 'forcible opposition could prevent the execution of the laws'.[95] Clearly, Jackson's actions at this time foreshadowed the civil war, even though it was almost 30 years away. By threatening to use force against Confederate states, and explaining that secession is only possible by force, the only way to solve the differences between the North and South would be through war. This dispute in 1832 between South Carolina and the government is primarily about tariffs and not slavery. Therefore, it seems logical to argue that if the 'Tariff of Abominations' and the threat of secession triggered fighting talk from the President in 1832, then slavery was clearly not the only trigger of war.

Just as the implementation of tariffs was controversial, causing disputes between the North and the South, other Acts of Congress were incredibly divisive. When attempting a peaceful proposition to the transcontinental railroad, Senator Stephen Douglas' Kansas-Nebraska Act once again pitched the North against the South. The slave states wanted the railroad to pass through the Southern states whilst Douglas proposed the railroad to stay above the Missouri Compromise line, placing it in Free-Soil states and Unorganized Territories, which, being above the Missouri Compromise line, meant they would become Free-Soil Territories. Under pressure from the South, Douglas' bill allowed for Popular Sovereignty to determine the fate of slavery in the Kansas-Nebraska territory, but it wasn't enough. The Southerners made him repeal the Missouri Compromise in total, which he did, angering the Free-Soilers and anti-slavers. At the time of incorporating it into his bill, Steven Douglas stated to the Senate, "I know it will raise one hell of a storm".[96] The passage of this bill then created 'Bleeding Kansas'- where pro and anti-slavery activists flooded into the territories to sway the vote. Therefore, the Kansas-Nebraska Act of 1854 caused undeniable tension between the Northern and Southern states as it was primarily appeasing slave states. Here, we see a pragmatic North where they allow Popular Sovereignty to run in the territory to achieve the transcontinental railroad which the North desired whilst at the same time allowing slavery to prosper. Because of this conflict, we see the formation of the Republican party, a representation of the disgruntled North and a worthy rival to the Democratic party, increasing the chances of further divisions and war.

With the formation of the new Republican Party, another significant point in time which triggered the civil war was the election of Abraham Lincoln in 1860, the first Republican President. When he gave his first inauguration speech to Congress on March 4th 1861, he said he had, "no purpose, directly or indirectly, to interfere with the institution of slavery in the states where it exists" and then went on to say, "Those who nominated and elected me did so with full knowledge that I had made this and many similar declarations and have never recanted them"[97]. In this speech he is giving his solemn word that he will not interfere with existing slavery at all. This opening speech depicts how Lincoln wanted to ease tension and maintain the Union, even if it meant slowing the progress of the abolitionists within his party. We can clearly see that the Northern politics is about pragmatics - maintaining the union rather than an anti-slavery ideology.

Leaders of the Confederate states seemed to be far more ideological in their viewpoint. At the time of secession from the Union, Alexander Stephens, the Vice-President of the Confederate states, gave a Cornerstone Speech, where he said, "The Cornerstone of the secession rests upon the great truth, the negro is not equal to the white man".[98] This clearly suggests that for the Confederate states, the need to split from the union hangs on the one fundamental point of whether black Americans can be used as slaves or not. Previously, in 1837, in a speech to the Senate, John C Calhoun argued that the "incendiary spirit of abolition had not yet 'infected' the Senate, or the great mass of the intelligent and business portion of the North; but unless it be speedily stopped, it will spread and work upwards till it brings the two great sections of the Union into deadly conflict".[99] So, once again, the ideological point of slavery is seen by the South as something to be defended by "deadly conflict" if necessary. Interestingly, the law makers of the North in the main, seemed to agree, prior to the war, with the views expressed above by the Southern politicians. In the 1856/7 Dred Scott

[93] https://www.gilderlehrman.org/history-resources/lesson-plan/nullification-crisis 10/1/26
[94] https://www.gilderlehrman.org/history-resources/lesson-plan/nullification-crisis 10/1/26
[95] https://legal-resources.uslegalforms.com/f/force-bill 12/1/26
[96] https://www.senate.gov/artandhistory/history/minute/Kansas_Nebraska_Act.htm 22/1/26
[97] https://avalon.law.yale.edu/19th_century/lincoln1.asp 8/2/26
[98] 'Arguing against the Lost Cause Narrative' - https://www.trinity.ox.ac.uk/sites/default/files/inline-files/ 2/1/25
[99] https://firstamendment.mtsu.edu/artical/John-c-Calhoun/ 2/1/25

verses Sandford case, the Supreme Court ruled that 'A free negro of the African race is not a citizen'. Furthermore, 'any law that would deprive a slave owner of that property was unconstitutional'.[100] The Fugitive Slave Act, made more stringent in Clay's Compromise of 1850, stated that any escaped slave would be returned to their owner, even if the slave made it into a Free-Soil state.[101] Once again, Northern law makers were willing to add this to the constitutional law if it were to ease tensions. Similarly, Abraham Lincoln's stance on slavery was not in line with the abolitionists of his party. In 1858, in the Chicago Daily Press, Lincoln wrote, "I am not, nor ever have been, in favour of bringing about in any way the social and political equality of the white and black races". He also stated, "...there is a physical difference between the white and black races which will ever forbid the two races living together on terms of social and political equality". [102] Although the Northern states wanted to end slavery, it appears from the evidence above that equality would never become feasible among the two races in any shape or form in America. This is evident also in the introduction to the Census of 1860, where it states that 'the white race is no more favourable to the progress to the African race than it has been to the perpetuity of the Indian on its boarders' and also 'the coloured population, free or slave, must be greatly subordinate to the white race and is doomed to rapid absorption, or extinction'. [103]From the census it is clear that the abolition of slavery would not mean equality of any kind as the black population were considered at this time a subordinate or inferior race, lacking in morals.

In conclusion, this essay has highlighted several factors that drew the United States into Civil War. The fact that it was a 'Young giant' of a country growing exponentially, more than likely leading to the formation of free states who would have been allied to the North, must have caused concerns to the Southern states. In addition, the tariffs imposed by an industrial federal government created a significant rift between the North and the South, as the South saw acts being passed that favoured the North and punished the South. The politics of the South and the North contrasted greatly: the South being more ideological, trying to protect their way of life and right to slavery, whereas the North took a pragmatic approach, believing in white supremacy over the black Americans, but not requiring slavery to support their prosperity. However, they were willing to compromise over slavery in order to increase the expansion westward across Unorganized Territories and at the same time maintain the Union. Interestingly, the 1860 Census predicted the absorption or extinction of the 'coloured race' which, if it had been true, would also have signalled the end of the Southern economy as it was then known. If the census had been widely read and believed, it seems likely that the South would have had to act to protect its own interests. Untangling the concept of slavery from all the other social, political and economic issues seems to be an attempt to oversimplify the causes of the Civil War. If it had been a simple dispute over slavery, Abraham Lincoln's view of the black American should have conflicted that of Alexander Stephen's, which it didn't. However, the Southern states must have felt by 1861 that their way of life – as well as slavery – was slipping from their grasp, which, considering the expansion of territories into free states, was a reality.

[100] https://supreme.justia.com/cases/federal/us/60/393 6/2/26
[101] The Penguin History of The United States of America, Hugh Brogan, 2/1/26
[102]https://presidentlincoln.illinois.gov/education/educator-resources/teaching-guides/lincolns-views-african-american-slavery/ 22/1/26
[103]https://www2.census.gov/library/publications/decennial/1860/population/1860a-02.pdf page xii 8/2/26

Is genetic immortality in humans truly science fiction?

By Andrew H-J

Genetic immortality is the ability of a species or organism to live indefinitely without aging, or the indefinite persistence of a lineage's genes. But is this feat of genetics science fiction for humans? This question is one that has been at the back of the mind of geneticists since Friedrick Miescher isolated DNA in 1869 and was pushed to the forefront with the huge advancements in recombinant DNA technologies such as CRISPR; discovered in Japan in 1987, allowing humans to push the limits of what had been pseudoscience only 40 years ago. This essay will discuss if genetic immortality in humans is science fiction and, if so, what is holding back?

Many geneticists provide many convincing arguments suggesting that genetic immortality - or at least vastly increased life span through genetic augmentation – is very realistic in near future. Firstly, we must consider the existence of the multitude genetically immortal animals[104] such as the "immortal jellyfish" - *Turritopsis dohrnii.* These are fascinating creatures with unique life cycles; It starts as a fertilised egg then grows into its larval stage called a planula. It then continues to grow a projection, from the now more developed polyp, called a bud. This process is then responsible for the next two stages of a jellyfish's life cycle to growth of a young ephyra the fully formed adult medusa for other species of jellyfish this is the end of their growth and will eventually die. However, the "immortal jellyfish – when faced with environmental threats such as a lack of nutrition or increased competition – it has some cells revert to the polyp stage of development while the larger organism may die the small clump of polyp cell will regrow the bud and the jellyfish will grow to adulthood avoiding the environmental stress and resetting their lifespan so they are functionally and biologically immortal.

Secondly, there are creatures that can repair their DNA virtually constantly. This prevalent genetic feat is evident within lobsters but to first understand why this is advantageous we must understand what the causes ageing in cellular organisms are.[105] Many causes of ageing have been theorised but among other factors such as oxidative damage; genetic instability - "wear and tear" is one of the oldest hypothesised causes. Our cells divide by mitosis on average once every 24h and each time this is done a whole copy of the DNA sequence has to be replicated and as this is completed, mutations within the sequence DNA bases occur and this accumulates over time until causing our cells to become

increasingly damaged as time passes eventually causing the signs ageing, we know.[106] Naturally, at the end of our Chromosomes we have a specialised sequence of DNA bases called telomers called the caps – it varies organism to organism but in humans it is the base sequence TTAGGG repeated thousands of times – these telomers protect the DNA sequence from drastic mutations and changes protecting the daughter cells of mitosis, but after every divide the telomers become shorter and less able to protect our chromosomes so damage becomes more and more significant, however lobsters have an abundance of enzyme called telomerase.[107] This enzyme can recreate damaged telomers leading to less damaged cells and in turn a generally longer lifespan for lobsters – lobsters usually live 30-40 years but can exceed 100 years thanks to this extortionary adaptation. [108]

Additionally, the extent of telomerase's ability can be seen within cancer cells and stem cells. Both cancer and stem cells have a greatly improved lifespan and can divide many times passed the Hayflick limit through their increased telomerase activity; this allows our stem cells (that are essential for our survival) to remain for longer so we need to produce less however, it also means that cancer cell populations grow faster as they all divide many more times before they die.[109]

Thirdly, we cannot ignore, the ability held by only a few in the whole of biological life to regenerate lost tissue, limbs and appendages as well as organs: axolotls can regenerate limbs, tissues and organs almost perfectly, flatworms can recreate whole body sections from tiny pieces but the most impressive of all is the ability of the small cnidarians called hydras – closely related to jellyfish – these organisms can regenerate almost any part of their body fully and perfectly. This ability has led scientists to suspect hydras of true genetic senescence meaning they are unable to age and face none of the detriments age gives other organisms; Studies suggest that 5% of a single hydra colony can live upwards of 1400

[104] The animals that can live forever - Curious 27/11/25
[105] What lobsters can teach us about immortality 27/11/25
[106] Aging: The Biology of Senescence - Developmental Biology - NCBI Bookshelf 4/12/25
Why do cells cycle with a 24 hour period? - PubMed 4/12/25
[107] Biochemistry, Telomere And Telomerase - StatPearls - NCBI Bookshelf 11/12/25
Telomeres and telomerase (article) | Khan Academy 11/12/25
[108] Are lobsters immortal? | Natural History Museum 15/12/25
[109] Ageing genes and the anti-cancer clock 08/01/26

years and 3000 years for certain species.[110] They do this thanks to their bodies being completely saturated with stem cell that can differentiate at any point into whatever cells the hydra needs to maintain its body's functionality. This constant regeneration refreshes the small 30mm long body with new healthy cells all the time allowing for them to be, as many scientists hypothesise, genetically immortal.[111]

However, despite the seemingly convincing nature of these arguments, there are several flaws in the reasoning. While many animals are capable of greatly improving their life span through complex adaptations there is little evidence to suggest that these can be recreated within homo sapient biology. Human's genetics differ greatly from that of jellyfish so it would be highly unlikely that the biochemistry that allows other organisms to increase their lifespan would be transferrable to humans. While the immortal jellyfish, for example, can revert to the infant stage it would not be likely that a humans could keep a clump of cells and regrow a new body. Furthermore, humans are much larger and much more complex with average adult human having 30-40 trillion cells and 60 different studied tissue systems whereas the organisms with regenerative properties are small with simple body structures – hydras only having around 50,000 - 100,000 cells comprising their bodies allowing regeneration of new healthy cells to be more reliable and less energy intensive for the organism's body; the sheer volume cells in the human body means that regeneration would be slow, very energy intensive energy and realistically unfeasible for large mammals like humans.[112]

While they ability of telomerase is intriguing and promising with studies showing rodents with increased telomer length having an increased lifespan , however despite this, it's effect on humans and other long-live animals is difficult to study effectively due to the length of time the clinical experiment would take and implementing it in and completing proper clinical trials would take many years to complete.[113] In addition, telomerase does not grant genetic immortality as we defined it earlier, while it does have an undeniable, positive effect on lifespan, it does not grant immunity to senescence further suggesting that it will not be the key to human genetic immortality but will help to improve longevity. Moreover, gene editing technologies are still very modern technologies; while CRISPR (clustered regularly interspaced short palindromic repeats – a powerful gene editing tool) was observed by Yoshizumi Ishino, in the viral defence of prokaryotic organisms, it wasn't until 2012 that Jennifer Doudna and Emmanuelle Charpentier displayed CRISPR – Cas9's ability as a gene editor.[114] So even the deliberate, increased expression of the telomerase gene into the human genome would be difficult in of itself. [115]

It is therefore more convincing to argue that, currently, human genetic immortality is science fiction it may be possible in the far future as our technology expands and our knowledge of the human body becomes more in depth on a molecular level. So, what is holding these advancements back? Primarily, comes the existence of the Hayflick limit. This is a limit on the number cells can divide before expiring. As previously discussed, as cells divide, they become more damaged eventually having had their DNA so damaged that they die naturally or undergo intrinsic or internal apoptosis where the cell has a programmed cell death because it has DNA damage which could lead to the formation of tumours. This evolutionary limit on cell life span – around 40 to 60 divisions depending on the cell type within humans - means that naturally cells die off so genetic immortality within human cells would require alteration of this fundamental part of the cell life span to achieve genetic immortality. While this is perhaps possible with use of modern DNA editing technologies, its effects on the human body could lead to all sorts of complications. A study published -in the *New English Journal of Medicine* on May 4th, 2023 -led by Dr Mary Armanios of John Hopkins university – identified 17 different people from 5 separate families with the POT1 mutation (A gene which regulates telomer length and protection). While they had telomers 90% longer than the average human, with delayed signs of ageing such as the greying of hair, 15 out of the 17 of the participants had an abnormal tissue growth called neoplasms with some being benign and some cancerous. After analysing their blood, they found 67% had a condition called CHIP (clonal haematopoiesis of indeterminate potential) which has been linked to an increased risk of blood and other cancers leading researcher to conclude that the increased telomer length increased the risk of cancer.[116] Furthermore, researchers suggest that from a group of 11,108 melanoma and 13,933 control patients, individuals with predicted longest telomers had 30% increased risk of developing a melanoma.[16] This shows how dangerous and life-threatening altering telomer length and telomerase levels can be as cells accumulate genetic damage over their longer lifetime.

In Addition, the human body is still not yet fully understood; Organ systems – most prevalent the central nervous system and the complexities of the human brain – are still very misunderstood by the scientific community. While CRISPR gene therapy for brain diseases has made significant strides within healthcare, such as with AMT-130 a gene therapy for Huntington's reducing the advancement of the disease by 75% increasing the average life expectancy by 3 years[17] , however those treatments have been very targeted and without extensive studies it would be near impossible to suggest what effects any anti-ageing genetic therapies would have on the incredibly delicate system that is the human brain and with lots of neurological processes still

[110] Cellular and Molecular Mechanisms of Hydra Regeneration - PMC 14/01/26
[111] Hydra | Freshwater, Cnidaria, Polyp | Britannica 19/01/26
[112] The human cell count and size distribution - PMC 19/01/26
[113] Telomeres and Longevity: A Cause or an Effect? - PMC 20/01/26
[114] CRISPR Timeline | Broad Institute 25/01/26
[115] Telomerase and the aging process - PMC 25/01/26
[116] Familial Clonal Hematopoiesis in a Long Telomere Syndrome - PubMed 30/01/2026

misunderstood it may be very easy to disturb making gene editing anti-ageing techniques very difficult to be successful. One case of these unintended consequences was in the gene therapy treatment given to 18-year-old Jesse Gelsinger in 1999. In a trail lead by Dr James Wilson, from the university of Pennsylvania, to cure OCT (ornithine transcarbamylase) deficiency. Jesse who had partial OCT deficiency - a fatal condition whereby the body is unable to process ammonia leaving 50% of all newborns with full OCT comatose within 72 hours of being born and the rest pass away before 5 – was given a regular virus (a cold) encasing the correct OTC gene attached, the virus working as a DNA recombinant. Jesse experienced a serve immune reaction and died 4 days later. With the FDA closing the trails and later, in 2000, creating new patient protection for people undergoing gene therapy.[18] This is just one of the many possible outcomes of genetic therapy trials; whilst the applications of genetic modification are almost limitless and have the potential to save many lives the effects on the human body are still unknown and unique of every trial. Leading us to conclude that genetic modification to increase lifespan is very risky and potentially dangerous without serval years of testing and more through knowledge of human ageing.

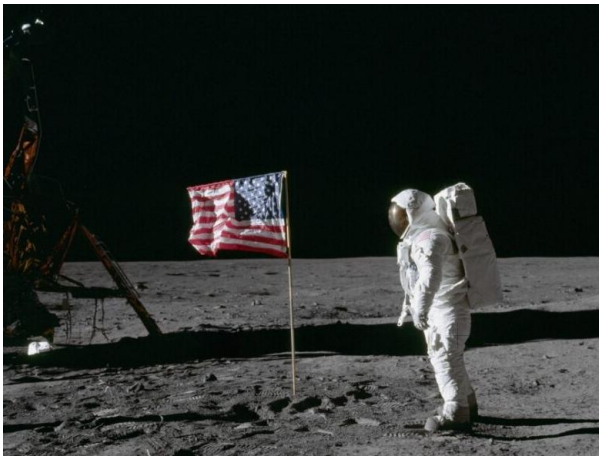
In conclusion, we can see that genetic immortality, while an unrealistic feat of genetics with modern DNA modification techniques, it could well be possible as new revolutionary research. It has been shown to be possible in other animals and advancements within bioinformatics, simulations and gene editing come about it may become a very realistic possibility, especially with Chinese President Xi and the Russia President Valdimir Putin talking about the possibility of eternal life in the future and suggesting that this century predictions estimate that lifespan could be around 150 years. So, genetic immortality could be closer than we think.[19]

Is research in space still worth it?

By Luke P

There are strong arguments both for and against the pursuit of research in space. For example, astrophysicists may argue that research in space is still very important to learn more about celestial objects and phenomena whilst also pushing the limit of human engineering. Other people who are opposed to research in space may say that transporting people, equipment and supplies into space is too expensive and resource-intensive to be justifiable whilst we could be putting that time, resources and money into solving the more pressing and imminent problems on earth. Ultimately, having reviewed the arguments on both sides, this essay will argue that research in space is not only still worth it, but vital for the future of humanity.

As stated, there are some powerful arguments for the discontinuation of research in space. Firstly, some people may argue that the cost of sending people, equipment and supplies into space cannot be justified when that money could be put to tackling earths more immediate problems such as climate change. For example, NASA's space shuttle had a cost of about $1.5 billion to launch 27,500 kg to Low Earth Orbit (LEO), $54,500/kg.[117] On average, one tree absorbs approximately 25kg of CO_2 per year, making them vital for the sequestering of carbon from our atmosphere and planting trees is an extremely important task to combat the increasing rate of CO_2 emissions and secure the future of the human race.[118] The general marketing campaign for planting trees through charity is ~US$1 can



get 1 tree planted.[119] Therefore theoretically 54,500 trees (capable of sequestering approximately 1,362,500kg of CO_2 from the atmosphere per year) could be planted for every 1kg of material transported to space.

Secondly, there is a serious and multi-faced risk to the lives of astronauts and cosmonauts that conduct missions and research in space. These risks range from physical – such as exposure to dangerous ionizing radiation and cosmic rays that would normally be deflected by the earth's magnetosphere – to phycological – such as the development of behavioural or cognitive conditions caused by the extreme isolation and confinement of living in space.[120] One notable example of the fatalities caused by equipment malfunction was the Columbia STS-107 mission in 2003. The Columbia STS-107 lifted off on January 16, 2003, for a 17-day science mission featuring numerous

[117] Harry W. Jones, *The Recent Large Reduction in Space Launch Cost* (2018), https://ttu-ir.tdl.org/items/bc37e942-bf12-479c-8fc6-4711c0e270d4 (24/01/2026)

[118] EcoTree, *How much CO2 does a tree absorb?* https://ecotree.green/en/how-much-co2-does-a-tree-absorb#:~:text=A%20tree%20absorbs%20approximately%2025kg,For%20fun (24/01/2026)

[119] Scientific American, *The Real Cost of Planting Trees* (2021), https://www.scientificamerican.com/article/the-real-cost-of-planting-trees/ (24/01/2026)

[120] NASA, *5 Hazards of Human Spaceflight* (2025), https://www.nasa.gov/hrp/hazards/ (24/01/2026)

microgravity experiments. Upon re-entering the atmosphere on February 1, 2003, the Columbia orbiter suffered a catastrophic failure due to a breach that occurred during launch when falling foam from the external tank struck the reinforced carbon-carbon panels on the underside of the left wing. The orbiter and its seven crew members were lost approximately 15 minutes before Columbia was scheduled to touch down at Kennedy Space Centre.[121] Their death and the death of many others like them serve to remind humanity of the countless dangers posed by an environment as hostile and unforgiving as outer space.

Finally, and perhaps most compelling, we must address the significant impact on the environment that is caused by transporting payloads into space. For an object as massive as a rocket to overcome earth's gravitational field and propel itself all the way to outer space, a huge downwards force needs to be applied by the rocket engines. Some of the most common substances used as rocket propellants are liquid oxygen as the oxidiser and either liquid hydrogen or kerosene as the fuel.[122] When these chemicals react to propel the rocket upwards, a large amount of greenhouse gasses are produced such as water vapour and carbon dioxide which trap infrared radiation from the sun inside our atmosphere, contributing to the enhanced greenhouse effect and accelerating global warming.[123] If a hydrocarbon like kerosene is used as the fuel, solid particulates of carbon can be produced. These particulates can cause health problems for humans because they irritate the lining of the lungs, worsening respiratory conditions like asthma. If the particulates are small enough they can travel deeper into the lung tissue and cause damage that could lead to cancer and heart disease.[124] The soot particulates also absorb infrared radiation, contributing to global warming. Due to the fact that these particulates are released throughout multiple layers of the atmosphere, they are '500 times more efficient at warming the atmosphere' than soot released on the surface by vehicles.[7] The high temperatures of rocket engine also cause oxygen and nitrogen gas to react to produce various nitrogen oxides (NO_x).[7, 8] All nitrogen oxides are toxic and contribute to respiratory disorders like asthma, and nitrogen dioxide (NO_2) in specific can react with water in the atmosphere to produce nitrous acid and nitric acid: $2NO_2 + H_2O \rightarrow HNO_2 + HNO_3$.[8, 125] Both of which can dissolve in the clouds, resulting in acid rain that damages stone structures and trees.

However, despite the seemingly convincing nature of these arguments, there are several flaws in the reasoning. For example, the argument about money being wasted on transport to space when it could be used to plant trees and therefore tackle the problem of global warming, is flawed because although planting more trees can sequester CO_2 from the atmosphere, this will be inconsequential unless we make drastic cut-backs in CO_2 emissions – the only real way to reverse climate change.[7] It should also be noted that whilst transport to space is expensive, it is relatively low when compared to a country's GDP. For example, in 2013 the US was spending only 0.23% of its GDP on space research.[126]

Similarly, the argument about the risks posed to the lives of astronauts and cosmonauts carrying out missions in space is weak because of the rigours and intense training astronauts and cosmonauts are put through to ensure they are ready for almost anything that may go wrong during missions into outer space. Not to mention the fact that they also all understand the associated risks with such an occupation and are prepared for the possibility of death.

The last argument about the launch of rockets causing damage to the environment, does raise a good point, however the exhaust materials (such as CO_2 and water vapour) from rockets are only responsible for a tiny proportion of global warming. For example, only 0.01% of soot emissions are caused by rockets and this soot is only responsible for 3% of the global warming effect caused by the soot released into the atmosphere by humanity.[127]

It is therefore more convincing to argue that research in, and transport to space are still very important today for science and humanity as a whole. When human engineering is pushed to its absolute limit – like in a rocket headed for outer space – other useful discoveries are bound to be made, which is why we must firstly look at not only the great advances in science made by research in space, but also the unexpected discoveries and surprise new materials that resulted from the extreme engineering challenge of transporting a human to outer space, that now greatly benefit humanity in day-to-day life, sometimes completely outside of the

[121] NASA, *Remembering the Columbia STS-107 Mission* (2025), https://www.nasa.gov/remembering-columbia-sts-107/ (24/01/2026)
[122] Embry-Riddle Aeronautical University, *Introduction to aerospace flight vehicles - Rocket Engines* (2022), https://eaglepubs.erau.edu/introductiontoaerospaceflightvehicles/chapter/rocket-engines/ (25/01/2026)
[123] BBC, *Is space travel a problem for the climate?* (2024), https://www.bbc.co.uk/sounds/play/w3ct3khq (25/01/2026)
[124] BBC, *The atmosphere - AQA Synergy*, https://www.bbc.co.uk/bitesize/guides/zym2k2p/revision/7#:~:text=Particulates%20(eg%20particulate%20carbon%20from,that%20could%20lead%20to%20cancer (25/01/2026)
[125] Libre Texts Chemistry, *The Chemistry of Acid Rain*, https://chem.libretexts.org/Bookshelves/General_Chemistry/General_Chemistry_-_An_Atoms_First_Approach_(Halpern)/Unit_3%3A_Stoichiometry/Chapter_8%3A_Aqueous_Solutions/Chapter_8.08%3A_The_Chemistry_of_Acid_Rain#:~:text=As%20a%20result%20of%20acid,neutralizes%20the%20acid%20via%20reaction.&text=The%20result%20is%20increased%20levels,3%20 (25/01/2026)
[126] World Economic Forum, *Which countries spend the most on space exploration?* (2013), https://www.weforum.org/stories/2016/01/which-countries-spend-the-most-on-space-exploration/#:~:text=US%20spending%20on%20space%2Drelated,of%20GDP%20went%20on%20space (25/01/2026)
[127] Khaled Diab, *Billionauts' space tourism and Mars fantasies need to be pulled back to Earth* (2024), https://carbonmarketwatch.org/2024/08/30/billionauts-space-tourism-and-mars-fantasies-need-to-be-pulled-back-to-earth/#:~:text=This%20is%20reflected%20in%20the,have%20far%2Dreaching%20environmental%20consequences (25/01/2026)

aerospace field. Perhaps the most widely recognized NASA spinoff is memory foam. It was invented by NASA-funded researchers looking for ways to keep test pilots cushioned during flights. Today, memory foam makes for more comfortable beds, sofas, chairs helmets, etc…[128] Other NASA spin off technologies include camera phone sensors, cordless tools, scratch-resistant lenses, and water filtration systems. Without such technologies human progress would be significantly reduced.

Secondly, space research and missions have had a profound positive effect on human society. In 1969 when humans set foot on the moon for the first time, a generation of children were inspired to pursue STEM careers, to become scientists and engineers and greatly accelerate the progress of humanity's technological developments. For example, astronaut Mike Massimino was six years old when Neil Armstrong and Buzz Aldrin took their first steps on the Moon in 1969.[129] 'That's what inspired me to go into space,' said Massimino.[13] 'I remember thinking very clearly that this was the most important thing that has happened in hundreds of years.' After graduating with a PhD in mechanical engineering from the Massachusetts Institute of Technology (MIT), Massimino was selected as a Nasa astronaut in 1996 and over two missions, he spent more than 30 hours spacewalking to repair the orbiting Hubble Space Telescope.[13] One of the most profound effects of the moon landing was the middle to late 20th century advancements in computing – something that a raft of inventors and entrepreneurs owe their success to. 'Apollo was the moment that people stopped talking about how big their computers were and started bragging about how small they were.' said David Mindell, professor of the history of engineering and manufacturing at MIT and author of *The Apollo Guidance Computer*.[13]

Thirdly, we must address the significant discoveries that have been made about space and celestial objects thanks to experiments done in outer space. For example the Cosmic Background Explorer (COBE), launched in 1989, studied the radiation still left from the Big Bang to better understand how the universe formed.[130] In 2006, John Mather of NASA and George Smoot of the University of California shared the Nobel Prize for Physics for confirming the Big Bang theory using COBE data. This discovery and many others, such as: the age of the universe (13.77 billion years), the behaviour of dark matter, the nature of black holes, the habitability of Mars, etc… has helped further our understanding of not only our solar system, but the entire universe.[14]

Furthermore, the arguments presented here are particularly convincing. For example, the argument about NASA spin off technologies is powerful because it highlights the need for human engineering to be continually stretched to its limits by research in space, in order to stimulate the discovery and invention of useful new technologies. Similarly, the argument about inspiring new generations of children to pursue STEM careers is strong as for the human race to continue to thrive we will always need new and better technology, which can only be supplied by enthusiastic people ready to take on difficult engineering problems (like climate change) and push science to its limits. Finally, the argument about discoveries made about the cosmos, is also powerful because knowledge about how our solar system and the universe work will be vital for the long-term future of the human race, especially if we are to one day leave earth.

After reviewing both sides of the argument, it can be concluded that research in space is not only still worth it, but essential for the future of the human race. While the weaker side, that argues the time of research in space has passed, has some good points, such as the significant impact on the environment rocket launches can cause (especially if redundant "space tourism" becomes more widespread), the stronger side that argues research in space is still vitally important, is more credible due to especially strong arguments such as the amazing spin-off technologies that have resulted from research in space, not to mention all the discoveries made on science missions to space that have helped us further unravel the mysteries of the cosmos. While the earth is certainly a priority, to ensure humanity survives, we must also look beyond it.

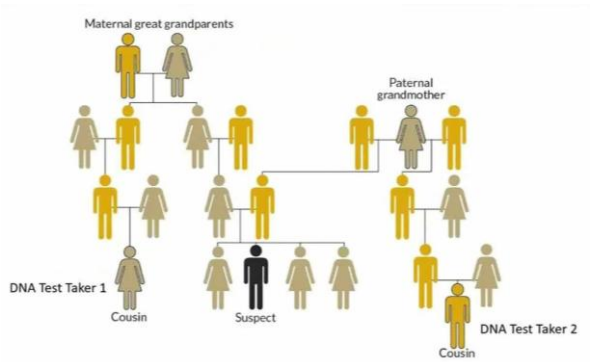
[128] NASA, *Memory Foam* (2016), https://www.nasa.gov/image-article/memory-foam/ (02/02/2026)
[129] BBC, *Apollo: How Moon missions changed the modern world* (2023), Apollo: How Moon missions changed the modern world - BBC Future (03/02/2026)
[130] NASA, *Mysteries of the Universe*, https://www.nasa.gov/specials/60counting/universe.html (04/02/2026)

Should genetic genealogy be used as a method of suspect identification in the UK?

By Nye P-D

There are convincing arguments for and against the use of genetic genealogy in the UK. Many people will argue that it is an effective method that could improve suspect identification despite its few ethical implications. For example, it has been proved useful in solving foreign cold cases such as the Golden State Killer and there is support for its use, evidenced by large samples. A further benefit of genetic genealogy is that there is unambiguous evidence that it develops on the familial research technique. This is due to evidence that it has resolved over 600 cold cases in the US. In contrast some people would argue that it is a suboptimal use of workforce and government expenditure due to the limited range of evidence that can be used. An issue commonly highlighted against the use of genetic genealogy is the high degree of danger that consent cannot be freely given. This is due to the hereditary websites lacking adherence to policies regarding the use of genetic information by law enforcement. There is also a lack of informed consent; the use of genetic information by law enforcement can expose sensitive and confidential information regarding health and social factors. These could be about other family members who have not consented to the use of their genetics. Having reviewed both sides of the argument this essay will argue that genetic genealogy should be used as a method of suspect identification in the UK, however there should be clear and precise laws that must be conducted to use it in an investigation.

As previously outlined, there are many convincing arguments against the use of genetic genealogy. Firstly, genetic genealogy compares SNPs (single nucleotide polymorphisms) from autosomes (which are non-sex chromosomes) from the crime scene to an online hereditary data base such as GEDmatch. This allows the DNA to be to be linked to distant relatives in the data base, in an attempt to trace the relative to the perpetrator of the crime. Using this method, a relative can be detected with a 0.8% match of autosomal DNA. However, to identify a link this accurate the sample of DNA is restricted to a large sample of blood saliva or semen. Due to there only being such a small range of potential DNA that is of sufficient quality to use, the use of these investigatory methods could be deemed a suboptimal use of work force and government expenditure. This is evidenced by Parabon as they recorded an average case to take 24 hours and cost £4000[131].



A further persuasive argument outlined against the use of genetic genealogy is that there is a lack of informed consent experienced by users of online hereditary data bases such as GEDmatch or FamilyTreeDNA. This is due to problems of adherence; even if a user does not 'opt in' to law enforcement access, many companies will supply legal authorities with information if presented a legal order. FamilyTreeDNA's privacy statement clearly shows this. The statement reads 'Please note, if you decline to participate in Investigative Genetic Genealogy Matching, we may still be required to share your Personal Information to comply with a valid legal process as described in Section 5.D.'[132]. This shows that investigative genetic genealogy does not protect individuals' genetic data and prevents a promise of privacy to those using online hereditary websites. A report by Laestadius et al evidenced this as it claimed that 25 out of 30 (83.3%) companies involved in the study 'stated in their terms that they may be required to disclose data to legal authorities without the consent of the customer' [133].

A key limitation of the use of genetic genealogy is that the use of genetic information from online websites can expose sensitive and confidential information about relatives that have not consented to the use of their genetics. There is a lack of consent even if the user uploading the data has consented to legal access. The SNP's used in genetic genealogy contain a wide range of personal information relating to risk of disease, geographical origin, or physical appearance. When compared to the use of STR profiles used in the current method of familial researching, SNP's have a potential of exposing much more harmful and sensitive information. The use of SNP's could also expose familial relations. 'The chance of finding at least one third cousin in a database of one million people is reportedly already as

[131] Should we be making use of genetic genealogy to assist in solving crime? A report on the feasibility of such methods in the UK, Mark Jobling and Denise Syndercombe Court et al (9 September 2020)

[132] FamilyTreeDNA Privacy Statement, Published 10th January 2023 https://www.familytreedna.com/legal/privacy-statement/04102024?srsltid=AfmBOoqWe-cvdBQ8ZLgzeX6FufV9BrT7BnRCdR6xZzJeb2wFAgfMQ9Ia#:~:text=Please%20note%2C%20if%20you%20decline,as%20described%20in%20Section%205.D.

[133] Commercial DNA tests and police investigations: a broad bioethical perspective, Nina F De Groot, Britta C Van Beers, Gerben Meynen, Published 29th November 2021

high as 90%'[134]. This shows how effective genetic genealogy is, but this information also suggests that a breach of privacy regarding genetic information from SNP's could present the problem of exposing family members who are not known to the rest of the family.

However, despite these arguments conveying some very convincing limitations of genetic genealogy, they contain some fundamental weaknesses. For example; whilst SNPs can expose sensitive information and cause a breach of privacy, the SNP must be decoded using specialist techniques to gain this information. Due to the high sensitivity of information that SNPs contain, 'raw genetic data are not disclosed to law enforcement.' and '(…) only the possible genetic kinship among individuals is shown'[135]. This suggests that law enforcement can only access the relationship between SNP's and do not have the techniques available to decode the information that is disclosed. Furthermore, despite Parabon estimating an average case to cost £4000 and 24 hours of work, this cost should be compared to the potential further harm, destruction and grief the criminal could cause if not caught, suggesting the cost should not be a deciding factor of its use.

These unsupported arguments suggest that not allowing genetic genealogy is a weak argument and that arguments for the use of genetic genealogy are more compelling. First of all, there is evidence that genetic genealogy has been vital in solving foreign cold cases such as the Golden State Killer. Investigators uploaded DNA evidence from the crime scene onto GEDmatch and identified relatives of the killer. Next investigators used traditional genealogy techniques to construct family trees and identified the killer as Joseph James DeAngelo based on physical similarities to the witness descriptions[136]. Once this had been established law enforcement obtained a discarded item containing DeAngelo's DNA which was confirmed as a match to the crime scene DNA. DeAngelo was arrested in April 2018 for murder and rape, proving the efficacy of genetic genealogy.

Secondly, there is strong support for the use of genetic geneology from the public. Despite the support statistics being critically understudied, the results from an online survey of 373 university students showed that 'students had higher support levels for investigation of violent crimes (76 %) and crimes against children (78 %)' whilst there was lower 'support for non-violent crimes (60 %)'[137] due to the severity of the crime relative to the level of personal invasion. This shows there is limited but strong public support for the use of genetic genealogy and suggests that more surveys should be made to gain a greater understanding of the public view on genetic genealogy.

A further convincing argument in support of genetic genealogy is that it is a development of the currently used familial research technique. This technique can only identify parents, siblings, and children with a very low success rate of around 20%.[138] in contrast, using genetic genealogy there is a '90% chance that third cousins will share enough DNA for the relationship to be detected' and a '50% chance that you will share enough DNA with a fourth cousin for the relationship to be identified'[139]. This shows that due to the high accuracy of genetic genealogy it could be used to fill the 80% accuracy gap experienced when using the familial research technique.

In conclusion, the strongest argument regarding the use of genetic genealogy is that it should be used as a method of suspect identification in the UK. Whilst the arguments against its use are strong due to its ethical implications and potential wastage of government expenditure and work force, as evidenced by Parabon's research, there are some counterarguments which discredit these points. The stronger argument is that genetic genealogy should be used as its use has the potential to dramatically improve the percentage of cases which are closed with the perpetrator charged as it has 'already solved over 600 cold cases'[140]. This benefit could revolutionise police investigations and simply cannot be discredited. With strict regulations, the implications of consent and cost would be able to be controlled as the technique would only be used in rare, serious cases where there are no other techniques available to identify a suspect. Therefore, the cost would not be a drawback as there would be further costs involved with the potential harm and damage caused in the future if the perpetrator is not identified and charged.

[134] Commercial DNA tests and police investigations: a broad bioethical perspective, Nina F De Groot, Britta C Van Beers, Gerben Meynen, Published 29th November 2021
[135] Privacy and genetic genealogy data, Ellen M. Greytak, David H. Kaye, Bruce Budowle, CeCe Moore, and Steven L. Armentrout, 31st August 2018
[136] genetic mysteries: should your data be used to solve crimes, Lyndsey Fletcher, 30th January 2024
[137] should the police use genetic genealogy databases to assist in solving crimes? Survey amongst university students. Hannah Marlor, Kate Randall, Aaron Opoku Amankwaa, September 2025
[138] Should we be making use of genetic genealogy to assist in solving crime? A report on the feasibility of such methods in the UK, Mark Jobling and Denise Syndercombe Court et al. Published 9 September 2020
[139] Autosomal DNA statistics *From ISOGG Wiki* last modified on 9 June 2025
[140] How Many Cold Cases Have Been Solved by Genetic Genealogy? Marc McDermottPublished Nov 6, 2023

Are physicists friend or foe?

By Holly C

From the planes in the sky to the buildings on the ground, the influence of physics is vast and greatly impactful. While the subject itself may not be enjoyed by everyone, it cannot be denied that physics benefits the entire world. Without physicists, Neil Armstrong would never have stepped foot on the moon. Without physicists, travelling across continents in mere hours would remain an impossible dream. Without physicists, much of the technology and the luxuries enjoyed by billions would simply not exist. However, as with most things, research into this subject has led to discoveries that are not without consequences. While the work of physicists has led to remarkable findings that have deepened our understanding of the world, and the creation of inventions that improve quality of life, it has also contributed to the suffering and pain of people. The same knowledge that drives progress can lead to unimaginable destruction. This article will explore both sides of the argument. On the one hand physics enables extraordinary advancements that enhance modern day life, on the other hand, it raises serious ethical and moral concerns. So, as you read this essay, consider both sides of the argument and ask the question, are physicist's friends or foes?

The impact of the discoveries made by physicists is apparent throughout the world, one example is within the field of medicine, where physics has been a major factor in the advancements of medical technology. Medical physics is a branch of medicine that applies the principles of physics to contribute to the development of medical technology and treatments. This term -"medical physics"- was first introduced in 1778 by Félix Vicq d'Azir, a French physician, anatomist, and the general secretary of the Royal Society of Medicine in Paris[141]. As technology has advanced over time, its role within medicine has become increasingly vital. One prominent example is the x ray, a tool commonly used to identify broken bones and fractures. X rays rely on electromagnetic waves that are able to pass through body tissue. Denser areas, such as bone, absorb more of these waves, while less dense areas will absorb less and allow the transmission of more waves. A detector, placed on the opposite side of the body, measures transmitted waves and uses the data it collects to produce an image. Using these images enables doctors to observe the internal structure of the body so they accurately diagnose injuries and provide the appropriate care. X rays were discovered by a German physicist named Wilhelm Conrad Rontgen on November 8th, 1895, while he was experimenting with cathode rays[142]. His discovery led to the invention of an essential diagnostic tool in modern medicine that has enabled doctors to treat and care for patients with a degree of specificity

previously impossible. Physics quite literally allowed doctors to see through the body, and the benefits of this breakthrough are undeniably valuable.

A further example that demonstrated the significant global impact of physicists' work is the advancement of transportation. Master Oogway famously stated 'Today is a gift that is why it's called the present' and few things save today's time more effectively than the use of modern transport. In England alone, approximately 83% of citizens reported using a private car at least once a week during the year 2024[143]. While this statistic eludes to the importance of transportation technology in everyday life, it only begins to illustrate its true significance. Modern transport extends far beyond the use of cars. Aeroplanes, trains, buses, and boats are relied upon daily, substantially reducing travel time and enabling people to explore and connect with all corners of the world. These innovations have transformed the way societies function, acting as a bridge between nations that had once been divided by arduous journeys and making long distance travel infinitely faster and more accessible. Such innovations, along with their many advantages, would have been impossible without the ingenuity and dedication of physicists who applied their expertise to develop these extraordinary machines. Take the aeroplane, for example. This phenomenal invention has granted humans the ability to fly, a desire that historical literature indicates has long been a human aspiration. The theme of flight reoccurs within ancient myths and legends, becoming the subject of history's most famous tales, such as the story of Icarus. Over time there have been attempts at flight, but the technology didn't truly take off until December 17th, 1903, when the Wright brothers made their first powered, controlled flight of a flying machine. Since then, humans have taken to the skies. Discoveries made by physicists throughout history have been fundamental to the development of aviation technology. For example, Isaac Newton's laws of motions informed the Wright brothers that generating sufficient aerodynamic lift was necessary to counteract the weight of their aircraft, enabling their machine to fly[144]. As aeroplanes have continued to evolve, an understanding of the principles of physics has remained

[141] https://www.news-medical.net/health/The-Role-of-Physics-in-Medicine.aspx (31/01/26)
[142] https://www.history.com/this-day-in-history/november-8/german-scientist-discovers-x-rays (31/01/26)

[143] https://www.gov.uk/government/statistics/national-travel-survey-2024/nts-2024-household-car-availability-and-trends-in-car-trips (01/02/26)
[144] https://www.grc.nasa.gov/www/k-12/airplane/wrights/liftold.html (01/02/26)

a crucial aspect of their advancement. Without foundational knowledge of forces and the way they act on objects, it would have been impossible to design machines capable of safely transporting large numbers of people through the skies. Even today, transportation continues to progress, cementing its role as an essential component of modern day life, a development made possible through the knowledge and contributions of physicists.

From space exploration and construction to computing technology and even within sport, there are countless examples that highlight the profound impact of physicists' work. Physics seeks to explain the fundamental workings of the universe, so its major influence in so many aspects of life should hardly come as a surprise. The fact is, physics has provided humanity with countless luxuries and tools, and this is indisputable. Humans are able to understand phenomena that would once have baffled the world. We have used this knowledge to significantly improve our quality of life, and with each passing day, technology continues to advance, offering us new opportunities and expanding possibilities. Yet physicists are far from finished. There is still much left to discover. The universe is immense and beautiful and humanity has barely begun to comprehend its complexity. As physicists continue to experiment and push boundaries, they will expand the scope of what we ever deemed possible. Just as flight would have seemed inconceivable thousands of years ago, we cannot yet imagine how future discoveries will shape the world. Physics is a gateway to development, and it would be almost immoral not to explore the possibilities the subject offers.

While the benefits of physics are irrefutable, it would be irresponsible to ignore the devastating consequences some findings have produced. Whether intentional or not, the impact of certain discoveries have, in many cases, resulted in widespread suffering and the loss of life. One of the more lethal threats facing today's world is modern weaponry, technology designed explicitly for causing destruction and death. Physicists have played a crucial role in the development of such weapons, providing the knowledge and understanding necessary for their creation. In April of 1707, Benjamin Robins was born, a man who would go on to transform the science of ballistics and lay the foundations of modern firearms. By applying Newtonian principles and his knowledge of projectile motion, Robins was able to make significant breakthroughs that would permanently alter artillery technology[145]. His most notable invention was the ballistic pendulum, a device that enabled him to take precise measurements of the velocity of projectiles fired from guns and provided a reliable method for assessing the effectiveness of gunpowder[146]. Using data gathered from this device, Robins demonstrated the substantial influence of air resistance on a projectiles trajectory. His findings challenged traditional designs of projectiles and led to the proposition of practical solutions to improve the range and accuracy of firearms. As a result, newly manufactured projectiles adorned a more aerodynamic shape adapted to reduce drag, marking a major step forward in weaponry design.Benjamin Robins can be described in many ways- a genius, a pioneer, a scientist- but more specifically, he was a physicist. He applied his knowledge of the principles of physics to the development of increasingly lethal technology, demonstrating how scientific knowledge can be harnessed for destructive ends. Through his work, Robins contributed to the emergence of more efficient killing machines that could come to fruition due to his understanding of physics. It can be argued that, without his application of physics to weaponry, the world would be a safer place. Guns, the devices responsible for countless deaths, would be less effective and less deadly, never having evolved into the highly lethal machines that plague the world today. While firearms may offer certain benefits, the undeniable truth is that physics has sharpened humanity's power to take life, to murder.

On August 6th, 1945, a bomb detonated and the world forever changed. 180,000 people died. 5 square miles of city were obliterated[147]. Homes, schools, entire neighborhoods collapsed. August 6th, 1945 marked the day that Hiroshima became the first city to suffer the devastation of an atomic bomb. During the Second World War, the push for the advancement of nuclear technology intensified into desperation. It became increasingly clear that whichever nation first mastered this power would gain a decisive advantage in a War that had already claimed millions of lives. Ultimately, it was scientists within the United States of America who became winners of this race. Following the formal approval of President Franklin D. Roosevelt, the Manhattan Project evolved into a massive undertaking on December 28th, 1942, marking the beginning of a journey that would lead to the birth of unprecedented and unmatched weaponry. J Robert Oppenheimer, a leading theoretical physicist of the time, was burdened with the immense responsibility of turning nuclear bombs from abstract theory, into tangible reality. As head of a team composed of America's brightest scientific minds, Oppenheimer oversaw ground breaking advancements that used extensive knowledge of the nature of atoms to successfully produce the world's first atomic bomb[148]. The creation of the atomic bomb is perhaps the most impactful and most devastating consequence of the study of physics. It is the result of a plethora of scientific discoveries converging to forge a weapon so powerful that its very existence poses a threat equal to its detonation. The atomic bomb is a prime example of

[145] https://www.britannica.com/biography/Benjamin-Robins (02/02/26)
[146] https://mathshistory.st-andrews.ac.uk/Biographies/Robins/ (02/02/26)
[147] https://cnduk.org/resources/hiroshima-and-nagasaki/ (02/02/26)
[148] https://www.nationalww2museum.org/war/articles/making-the-atomic-bomb-trinity-test (03/02/26)

physicists wielding their knowledge in a profoundly destructive way, and its development has shaped the world into a far more dangerous place. Not only did the atomic bomb claim thousands of innocent lives, but it also hugely impacted global politics, fostering a deep mistrust between nations and plunging the world into decades of uncertainty known as the cold war. The world held its breath as rival powers stood poised to unleash unimaginable destruction. Though we may have avoided the total annihilation of our own race thus far, nuclear weapons remain an ever present threat to humanity. We live in a time when the extinction of our race could easily be self-induced. This is the legacy of an invention born from the minds of physicists.

Physics poses dangers that extend far beyond the hazards associated with the evolution of weaponry. It has been central to the development of computing technology, which in recent years have raised significant ethical dilemmas- such as AI. It has played a considerable role in the contribution of environmental concerns- such as the space debris orbiting Earth. And, machinery designed by physicists carries inherent risks- including electrocution, radiation exposure and laser related injuries. Simply put, physics is dangerous. It is easy to become distracted by the discoveries made by physicists that seem ground breaking and exciting but what must not be forgotten is that these discoveries can be equally, if not more, disastrous. The world is a very different place than it was hundreds of years ago, we have the ability to send messages across countries instantly, we can fly across continents in hours, we can touch the moon… we can destroy the Earth in seconds. Physics is not always a force for good. Physicists do not always act with the world's best interests at heart, and it is future generations who are forced to live with the consequences of this. J. Robert Oppenheimer was a man forced to witness the catastrophic outcome of his own creation, so let his words, the words of one of the greatest scientific minds of the time, serve as a warning: "Now I am become Death, the destroyer of worlds." - The power of physics can be catastrophic. It was over 75 years ago that physicists developed a bomb capable of levelling an entire city. Since then, technological advancement has never once halted, so just imagine- imagine what has been created since.

So, are physicists friends or foes? Is the good they do entirely overshadowed by the negative consequences of their work? Similarly to the universe itself, this question is complex and far from black and white- there is no definitive answer. On the one hand, their work, their discoveries, and their understanding has resulted in extraordinary development. Physics has enabled humanity to grow, to explain the seemingly impossible and to reach toward the stars. It has transformed the way entire continents live and societies view the world around them. Yet where there is progress, there has also been destruction. The discoveries made and explained by physics have contributed to pollution, the annihilation of cities and the death of thousands of innocent lives. It would be reasonable to say that physics has equipped humanity with the tools capable of its own destruction. But are physicists truly the problem? Physicists provide humanity with the opportunity to deepen its understanding of the universe, and their continued work will inevitably lead to further progress and happier lives. Physics may one day bring to life ideas that we have yet to even imagine, ideas that could transform the Earth. While it is true that their discoveries have been weaponised, the progress physicists have caused cannot be neglected. From the planes in the sky to the buildings on the ground, physics has impacted countless aspects of modern life. Although the potential consequences of their work should always be considered, physicists must continue to experiment and explore, for until we live in a utopia with complete understanding of our world, they will always be essential in the pursuit of progress.

Should we colonise another planet?

By Lara G

Becoming a cross-planetary species has been the work of science fiction writers for decades. Only now, it may be becoming our reality. There are many compelling arguments in favour of and against the colonisation of other planets. For example, environmentalists would argue that, by working towards the goal of colonising another planet, we may neglect the care of Earth and, as a result, let the environment degrade faster. They would argue that this is a major problem with current modes of space exploration because it means that it is more likely that, as a species, we will let the next planet that we colonise fall into ruin[149]. Another point that they may propose, would be that the possibility of technologies malfunctioning, with the chances of things going wrong being incredibly high as a mission of this size, would be a huge step up from anything that humanity has ever tried before. As a result, they could argue that we should focus our resources on Earth and protecting it so that it stays habitable, even if the missions to Mars fail or take a substantial amount of time to become successful. Contrasting this, many scientific innovators such as Elon Musk would argue that the goal of colonising another planet and becoming a "multi-planetary species"[150] would be very useful for the advancement of technology, as there are technologies that we have found increasingly useful in our day-to-day lives that were created during the Space Race. Another argument that they may use to defend their belief is that being able to sustain life on another planet is crucial to the survival and improvement of the human race for the future and avoiding the likely "doomsday event"[151] that will lead to the extinction of life on Earth. Ultimately, having considered both sides of the discussion, this essay will argue that the colonisation of other planets is not necessary for the survival of humanity and should not be the sole base of our research into space and developing new technologies.

There are definitely some powerful arguments towards the idea that colonising another planet would be beneficial for humanity. Firstly, their point may be that, by using the goal of sustaining life on another planet, the improvements in our current technologies would increase, and drive scientists to find new ways of doing basic things. This may be evidenced by the many technologies and practices that were created for the Apollo missions during the Space Race, that have now become part of our everyday lives. An example of these was the rapid improvement in food safety practices to

ensure the safety of the astronauts in Apollo[152]. The Hazard Analysis and Critical Control Point (HACCP) was created to ensure that all food that was manufactured for the use of the astronauts in space was free of microbes that may have made them sick. As a result of these improvements, almost all of the food we eat here on Earth also follows these same procedures to keep the standard of food safety high. This gives the impression that this never would have happened without the scientific goal of landing humans onto the Moon for the first time. Although the discovery of the HACCP may have faced more challenges if it did not have the advantage of a clear purpose, many other discoveries may have taken a far longer period to become so mainstream. For example, the modern water filtration system[153] was also created with the same goal and during the same period. Because of this, we now don't need to worry about the safety of the food and water we consume, among other technologies that we may use without considering their backstory.

Secondly, they may argue that colonising other planets and becoming a "multiplanetary species"[154] is important for the survival of the human race, as it would save us from going extinct. For example, we, as a species, may be able to escape the issue of global warming if we move a large population to Mars. This may be evidenced by the unfortunate probability that the rate of global warming and therefore climate change will continue to increase[155], and the effects of these processes will intensify over the course of our lifetimes. As a result, the idea of leaving the planet becomes a more feasible solution and may seem like the only resolution to these escalating problems. It is because of this that the goal of colonising another planet is becoming more relevant and is gaining support from governments, like the USA[156], making it a well-funded national objective as a pose to an ideal created by a company for its own purposes. Due to the increasing relevance of this reasoning, it begins to feel as though it is the sole saviour to our species.

[149] https://eu.usatoday.com/story/tech/science/2018/11/19/bill-nye-mars-were-not-going-live-there-make-like-earth/1905447002/ 17/01/2026

[150] https://www.youtube.com/watch?v=H7Uyfqi_TE8 13/12/2025

[151] https://www.youtube.com/watch?v=H7Uyfqi_TE8 13/12/2025

[152] https://www.nasa.gov/technology/tech-transfer-spinoffs/going-to-the-moon-was-hard-but-the-benefits-were-huge-for-all-of-us/ 11/12/2025

[153] https://spinoff.nasa.gov/Spinoff2004/er_1.html 07/01/2026

[154] https://www.youtube.com/watch?v=H7Uyfqi_TE8 13/12/2025

[155] https://www.climate.gov/news-features/understanding-climate/climate-change-global-temperature 04/01/2026

[156] https://abcnews.go.com/US/trump-musks-goal-sending-humans-mars-feasible/story?id=119386708 17/01/2026

However, despite how convincing these arguments may seem, there are a multitude of reasons that their evidence does not hold up. For example, the argument about the benefits for humanity in a technological sense is flawed because, although having a particular goal to reach is a key driver of these discoveries, it is not entirely necessary. This is because it may be better to slow down the rate of the technologies being created and focus the energy and funding for different types of improvements that would benefit the Earth more. If the same focus and drive was put to creating more sustainable energy resources, it could lead to better long-term discoveries that would either help humans get into space without the same environmental impacts or help to mitigate the effects of using the current technologies and fuels for space exploration. For example, the Artemis Space Launch System (SLS) has a large environmental footprint when it comes to the costs of manufacturing and fuelling the rocket. The fuel that is used in the launch system, such as liquid hydrogen and liquid oxygen, may not have a severe environmental impact from being emitted into the atmosphere, but their manufacturing process requires huge amounts of energy, around 13.8 kW per kilogram[157]. It is also a highly inefficient process, which causes substantial losses in the yield of liquid hydrogen produced and so, as a result, would require more of the substance to be made, to counteract the losses. If we bring our attention on discovering new fuels and energy sources, we may learn of a new fuel that has a more energy efficient manufacturing method and emits very little harmful substance into the atmosphere upon being used. This would allow us to be able to set our sights back onto getting to the Moon and beyond, to Mars, without the same environmental footprint.

Similarly, the argument that moving to another planet will avoid the extinction of the human race is weak because it is not necessarily a reliable method. This is because, in space travel, there are many things that could constantly go wrong. For example, in the Apollo 13 mission, one of the two oxygen tanks on the spacecraft exploded, leaving the crew with less than half of their supply of oxygen and electricity, and reliant on the battery power usually reserved for re-entry[158]. Despite thorough testing on each of the components of the spacecraft with no signs of malfunction, the oxygen tank still failed and, had it been even a few minutes later, could have ended fatally. This shows that, no matter the vigour of which the equipment is tested, it is still possible that it will malfunction and cause a severe risk to anything onboard. As a result, it is definitely not a foolproof method of 'saving' the human race, as many parts of the planned missions to Mars could go wrong. Another reason that leaving Earth is not the perfect plan that companies like Space X might claim it to be, is that the funding and planning for the missions to come are not as well thought out as possible. For example, Elon Musk has stated that he believes that he could get humans to Mars by 2030[159], however, this does not include the necessary infrastructure that would be needed for humans to be able to stay for any length of time. This means that it will take far longer, as the travel time for a round trip to Mars is between 2 and 3 years so each mission will have to be spaced out over a large period of time. NASA contrasts Musk's claims, as they believe that it will take nearer to 2 decades[160] to get to a position in which making the manned trip to Mars is a feasible option. As a result, it is likely that humans will not make it to Mars to achieve any great goals for another few decades.

In conclusion, colonising another planet is not a goal that we should be focused on completing in the near future. Although it may seem like a good driving factor for technological improvement and a backup planet, should the conditions on Earth deteriorate faster than we can counteract, it is not the best place to be setting our sights. It would be far better for humanity as a whole and for the environment of our current planet, for us to focus on more reasonable goals, such as improving our clean energy technologies which would help our long-term aim to reach the surface of another planet, while reducing the effects it has on our climate. It is therefore clear that the colonisation of Mars should stay a part of science fiction stories for the foreseeable future at least.

[157] https://www.cleanegroup.org/wp-content/uploads/Hydrogen-Liquefaction-Fact-Sheet.pdf 17/01/2026

[158] https://ntrs.nasa.gov/api/citations/20110015690/downloads/20110015690.pdf 21/01/2026

[159] https://www.youtube.com/watch?v=H7Uyfqi_TE8 13/12/2025

[160] https://www.independent.co.uk/space/elon-musk-trump-mars-trip-spacex-cost-b2718730.html 19/01/2026

Is cloning the key to reversing extinction and restoring ecosystems?

By Nate H

There are strong arguments for and against cloning being the key to reversing extinction and restoring ecosystems. For example, many people believe that human intervention in the natural world is wrong as it is interfering with the natural way of animals becoming extinct and new species coming about. This belief may be instilled through religion or just personal ethics. Other arguments concerns about cost and whether or not cloning is even a possibility. However, these arguments can also be seen as weak and countered by points such as the reintroduction of species already being a common practice. Ultimately, after reviewing both sides of the argument, it is clear that, if the process is conducted responsibly and sustainably; cloning could be the key to restoring some ecosystems and preventing or reversing extinction for many species.

As stated in the introduction the argument against bringing back extinct species through cloning does have some strong points, for example many claim that brining back these extinct species is a waste of money in the current struggling state of the world. This argument is backed up by many examples, one being dolly the sheep, this sheep was cloned in the year 1996 and cost an approximated 50,000 pounds.[161] Along with this immense cost the process took 277 tries to be successful.[162] This not only highlights the large economic burden but also the inefficiency of the process.

Secondly many critics of this idea believe that the cloning of the animals is not the issue, it is evident that we can clone animals that we have DNA samples of (dolly), however obtaining the DNA needed to clone extinct animals is the real reason many sceptics criticize the idea. For example, on October 1st, 2024, a group of scientists from Colossal Bioscience claim they had successfully brought back the dire wolf which had been extinct for 13000 years.[163] Yet this claim was widely disputed by many scientists claiming that they had not brought back the dire wolf and only alerted a wolfs genome, effectively creating a genetically modified wolf and not a real dire wolf. For many sceptics this shows that obtaining the DNA needed to conduct a de-extinction of species that have been extinct for long periods of time is impossible as there are no complete genomes available, therefore meaning that the cloning of long extinct species is extremely difficult to achieve.

Thirdly, ethical beliefs may lead to many believing that the introduction of extinct animals through labs and human interference is wrong and goes against nature. Religions such as Christianity claim that creation of life should only be done as God intended it, quotes such as “Woe unto him that striveth with his Maker! Shall the clay

say to him that fashioneth it, What makest thou?” to emphasis this point.[164] Many non-religious critics would argue that it is unnatural to clone as it isn't natural as life isnt created through the natural reproductive system and oversteps the line of human interference into the natural way of things.

These arguments may seem good on the surface, however when we dig deeper there are many flaws in these arguments; for example, the argument for the large sum of money required to clone organisms not being worth the investment on the surface seems like a good argument, 50000 pounds seems like a very large amount of money to create a single genetic copy of a sheep, yet this amount is not a lot of money at all on a global or even national level. For instance, the military budget of the UK over the years 2024-2025 was 60.2 billion Pounds, if a small amount of this budget went towards cloning it would lead to the huge refinements in the technology used to clone, these refinements could be what is needed to make this a long-term sustainable project.[165]

The argument criticizing the possibility of obtaining the DNA needed to clone extinct species is much stronger. This argument highlights the troubles of obtaining the complete genome needed to successfully create an exact genetic copy of an individual from that species. This is a huge issue in creating a direct copy of an individual from an extinct species. Per contrast many supporters of de-extinction and scientists believe that advances in genetic engineering and artificial intelligence could allow scientists to reconstruct the missing sections of DNA with high accuracy.[166] This process would not directly clone an organism, yet the goal of de-extinction is to bring back extinct species to benefit ecosystems, and the altering of DNA would lead to the key traits of a species would be present in the new organism and would therefore serve the ecological role the extinct species once played in nature.

Similarly, the argument off the process of cloning going against the natural way of things or religion is very weak.

[161] https://www.icr.org/article/426
[162] https://www.amnh.org/explore/ology/genetics/all-about-cloning2#:~:text=Like%20human%20twins%2C%20clones%20have,it%20to%20a%20different%20cell.
[163] https://edition.cnn.com/2025/04/07/science/dire-wolf-de-extinction-cloning-colossal

[164] Isaiah 45:9
[165] UK defence spending - House of Commons Library
[166] https://sangerinstitute.blog/2024/10/17/ai-and-the-future-of-generative-biology/

For instance, religions are very subjective and based on faith, so to disallow the process based on faith and not evidence would not be a valid reason to ban the cloning of animals. Equally the argument of cloning being unnatural is weak, many look at the process required to create life (e.g. fertilization of an egg through sexual intercourse) as the only "natural" method, yet this ignores the fact humans have used practices such as IVF, selective breeding and organ transplants. These are "unnatural" process yet are widely accepted for their benefits. Therefor labelling cloning as unnatural is inconsistent, as the "unnaturalness" of a process has never been an appropriate reason to prohibit an advancement in science and humanity.

It is therefore more convincing to argue that the cloning of animals could be used to restore natural habitat and reverse or prevent extinction. Firstly, the reintroduction of species is quickly becoming a more accepted practice, for example in the national park of Yellowstone, the elk population of the park in 1968 was one third of what it is today, yet the vegetation was suffering, this was due to the lack of predators, wolves were wiped out in the park in the 1930s, this meant the elk didn't need to change locations causing them to stay in one location for long amounts of time, leading to severe damage to vegetation in the area before the elk move and repeat the process.[167] The reintroduction of wolves in 1995 led to the elf having to move around, and despite the elk population being 3 times what it was in the 60s the vegetation around the park is far healthier than it was. And this effect on the vegetation benefited the ego system of Yellowstone hugely, one example being the amount off beaver colonies increasing by 9 times.

Secondly, the use and development of cloning technologies could be used to protect living species. For example, the technology could be used to artificially increase the populations of endangered species through practices such as using primordial germ cells to create bird sperm/eggs which is a similar practice to cloning current cloning and medical technology. Furthermore, a bank of genetic information of current animals could be created to preserve the current species of animals we have, this could be like the Svalbard Global Seed Vault which holds 1,301,397 samples of plants from all over the planet and acts as a safety net for the possible extinction of any of these species.[168]

Thirdly, cloning could play a large role in reversing extinction by reintroducing species lost through human activity. To many, it is considered our role as humans to protect the planet we live on; cloning provides a pathway to take responsibility for the extinctions we have caused and to reverse the damage that was done by those species being wiped out, allowing nature to recover creating stable ecosystems where humanity previously damaged and weakened them.

Furthermore, the arguments presented here are extremely convincing; for example, the argument about funding can be backed up by many more stats to show funding in many countries world-wide that could be cut or lowered to raise funds for a world-wide project. Similarly, the argument covering the restoration of ecosystems is strong because of the evidence behind the argument, not only were the wolves re-introduced into Yellowstone a huge success, but there are also meaning other examples of reintroductions working such as the Eurasian Beaver being reintroduced into the UK and Asia. If used correctly cloning could amplify the results of reintroduction by allowing a wider range of more helpful species into locations where they are required.

In conclusion, cloning has the potential to be the key to restoring ecosystems and preventing extinctions. Although some critics highlight concerns around high costs, ethical problems and scientific limits (such as difficulty of recovering DNA), these challenges are outweighed by scientific evidence and real-life examples. Successful reintroductions like the wolves in Yellowstone or the Eurasian beavers in parts of the UK show as examples for why reintroduction can be successful. De-extinction and cloning projects such as dolly the sheep and the creating of dire wolves (from altered wolf DNA) show how cloning and genetic modification work and can be the key to reversing ecological damage caused by humans on a global scal

[167] Wolf Reintroduction Changes Yellowstone Ecosystem

[168] Svalbard Global Seed Vault - Crop Trust

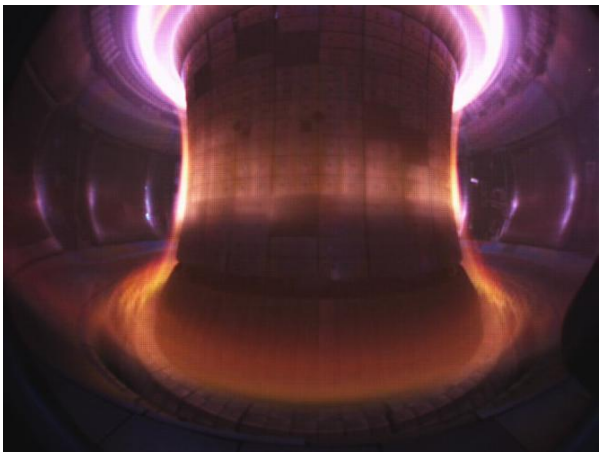
Is nuclear fusion a viable energy source?

By Alex M

There are some compelling arguments for Nuclear Fusion given its safety and potential power output. For example, the possibility of a nuclear fusion reactor is an immense amount of energy that can be produced for very little risk. Unlike nuclear fission reactors there is no chance of a meltdown as there is no possibility of chain reaction in a fusion reactor. In theory these reactors could be run indefinitely like a mini sun, producing power on a monumental scale and plans are already in development. The ITER Reactor is estimated to be completed in 2039 at a total cost of $28 billion, it will produce 4 times more energy than a nuclear fission reactor per kilogram of fuel, and 4 million times more than oil and coal. On the other hand, some groups may argue that nuclear fusion research is an unnecessary cost. Especially for a technology, that as of 2025, uses more energy than it produces. The lack of fuel for nuclear fusion reactors is also a cause for concern. Current predictions on the global stores of tritium in the year 2055 when the world nuclear fusion reactors like ITER will finally be operational, sit at roughly 20Kg. Tritium will fuel the ITER reactor which will likely need 125KG of Tritium yearly. Or should investment increase, through government and private funding, to refine fusion until reactors can be self-sustaining producing their own fuel in the form of Tritium breeding[169] at the cost of the public. Ultimately after considering both sides, this paper will argue in support of keeping nuclear fusion research a priority of the governments of the world.

Firstly, with 7.1 billion[170] US Dollars being invested yearly by Governments across the world some may argue that this money can be put to a better use. A very large scheme for a power source which cannot be feasibly achieved with current resources and would require further collecting of world resources. Is this money being put to the best use or can it have greater benefits to humanity elsewhere, such as in modernising current nuclear fission reactors.

Secondly, the necessity of Tritium as a nuclear fusion fuel is cause for concern considering the volatility and rarity of the isotope. The half-life of tritium is 12.3 years, meaning over 12 years half of a collection of tritium will be gone and unusable as fuel. This makes it very rare to find in nature and cannot be collected easily from sea water like deuterium can. The global reserves of tritium will not be enough to sustain a high-powered reactor like ITER, it is hard to find an estimate on global tritium supply but rough estimates from the International atomic energy agency (IAEA) predicts up to 30KG of Tritium available worldwide. 30KG of Tritium cannot run the ITER reactor for a single year, the only option is Tritium



breeding which is a yet unperfected method for getting tritium from the reactor itself.

Thirdly, the current success of nuclear fusion reactors is a cause for concern for the public. With promises of the first working reactor to be used for electricity production, ITER, only planned to be finished in 2039. There are many disbelievers who do not trust in the future of nuclear fusion and do not believe it's a real possibility. Such as Daniel Jassby who worked as a principal research physicist at Princeton Plasma Physics Lab until 1999. He wrote an article sharing his concerns in the effectiveness and safety of nuclear fusion.[171] This shows the divide between scientists across the world, perhaps alluding to the fact that nuclear fusion does not have full confidence that it will be the next big breakthrough in electricity generation.

However, despite the validity of these arguments there are some issues with the assumptions made. Firstly, the investments made into nuclear fusion are not futile. There have already been great advancements into nuclear fusion reactors. Such as the CEA's WEST tokamak[172] reactor located in France which has recently broken the world record[173] for longest running fusion reactor sustaining plasma for 22 minutes and 17 seconds. A great achievement showing that the research is showing progress.

Secondly, the lack of tritium for ITER is not a problem, due to its 12-year half-life, it cannot be stored for long before it decays. So it is produced as it is needed, largely in Canada, and as the first commercial large scale reactor ITER will not be expected to be completed until 2039, there is still many more years to perfect tritium breeding to reduce demands for new fuel for the reactor.

Finally, in the case of uncertainty in the scientific community, it is often the case that there are disagreements about potential breakthroughs. Nevertheless, the article by Daniel Jassby the research

[169] Fuelling – Tritium breeding

[170] The FIA (Fusion Industry Association) puts the global cost of research each year at 7.1 Billion US Dollars 2024-annual-global-fusion-industry-report.pdf

[171] https://thebulletin.org/2017/04/fusion-reactors-not-what-theyre-cracked-up-to-be/

[172] This Compact Tokamak Is on the Verge of Commercial Energy Production

[173] https://www.cea.fr/english/Pages/News/nuclear-fusion-west-beats-the-world-record-for-plasma-duration.aspx

physicist was published to “The Bulletin” a scientific news source that specialises in the dangers of everything nuclear. This shows there is a clear bias towards the new nuclear fusion technology in his article, making his statements on safety unreliable, as he does not supply many examples in which it is more dangerous than other forms of power stations.

It is therefore convincing to argue that nuclear fusion reactors are the way forward for energy generation for our planet. For example, nuclear fusion will be the most powerful source of energy compared to the mass of fuel used. It will produce 4 million[174] times more energy that oil and coal with no greenhouse gases and direct lasting effects on the environment. In comparison to fission reactors, it will be 4x as powerful compared to fuel used, not to mention the possibility of tritium breeding allowing the fuel to be made by the reactor as a side product as it runs. Creating almost endless energy for the planet if successful.

Another advantage is with its safety. Unlike nuclear fission reactors a nuclear fusion reactor cannot meltdown and release radioactivity into the surrounding area, like has happened so tragically before when using nuclear fission technology. This is because, keeping the reactor running is a very difficult task, if a breach were to occur the plasma inside would instantly stop as when fuel is cutoff it is impossible for the reaction to keep taking place there can be no chain reaction. There could also be no fallout due to tritium all the tritium being used up as fuel is cutoff, not even mentioning its low levels of radioactivity that has a half life of 12 years. No where near as dangerous to the environment as the fuel of nuclear fission reactors which have half lives of billions of years.

Nuclear fusion is a genuine future technology that may change the world. Supporting advancements like these will progress humanity, hopefully improving the world for everybody that lives in it. The safety of nuclear fusion compared to fission is a big pushing factor to get fusion implemented into the world, so as to protect the lives of people near to these reactors if something were to go wrong. The chance to have a clean energy source that doesn’t create a threat to the environment like gas, oil, coal and fission should be a major goal of the governments of the world because of the benefits to the people, and it is.

The government of the UK for example, wish to invest “2.5 billion over 5 years to lead the global race for fusion energy.” A prototype reactor is aiming to be built by 2040 at West Burton, Nottinghamshire[175]. This shows that the race for nuclear fusion reactors is already underway. Clearly it is obvious to the governments of the world that nuclear fusion is the technology of the future, especially the UK who believe “unlocking the power of the sun” is the way to provide families with “clean, unlimited energy”.

In conclusion, should nuclear fusion reactors be heralded as the future of clean energy? Clearly it will be a difficult challenge for the world’s scientists, potential fuelling problems due to the rarity of tritium could cause setbacks. However, the benefits of a potentially unlimited, safe and clean energy source are hard to ignore. The power density of a fusion reactor compared to its counterparts shows just how much of an advance in the technology of the world, perfecting a reactor like this could be. If we can bring the power of the sun to earth, what else could we do?

[174] What is Nuclear Fusion?
[175] **Fusion energy powers UK’s Industrial Strategy - GOV.UK**

Can science disprove religion on the origins of the universe?

By Joel R

There is considerable debate over whether religious views on the origin of the universe can survive in a world with a developed scientific understanding. Science and history have developed in diverging ways leading to tension. Many religions originated from faith and philosophical arguments. Contrastingly, science is peer reviewed with empirical evidence. Some scientific principles can be demonstrated using simple apparatus in certain experiments and achieve consistent results. An atheist may argue that science is the most reliable source of authority as it provides evidence that can be empirically proved and religion is not fit for describing the origins of the universe. A religious individual would argue that science and religion can co-exist, or disagree, with scientific discoveries conflicting with their religious views. This essay argues that science and religion are relevant in describing different sections of reality, therefore science does not disprove religion. This essay will focus on the origins of the universe and fundamentals of each field and, where specific theological examples are required, will use Christianity as a case study as it is the current largest religion according to the University of Cambridge website.[176]

Firstly, an argument from modern physics disagreeing with religious ideas on the creation of the universe. Einstein reflected on the origins of the universe and how it related to science "What really interests me is whether God had any choice in the creation of the world," "God does not play dice with the universe".[177] Einstein suggested that the universe was governed by rational order. Einstein theorised that the universe had to exist as we perceive it to be real and in the form we perceive. Humans live on the earth a 'Goldilocks planet'- a planet with conditions habitable for complex life. This requires the temperature and gravity to be within a liveable range and oceans to contain water. This is all dependant on the more fundamental interactions between sub-atomic particles that have constants assigned in equations defining ways which particles interact ever since the origin of the universe. Einstein suggested that the universe could only exist in this single way due to there being only one set of rules for physics. This is interpreted as meaning a creator is unnecessary for the universe to exist. Another argument proposed by Alastair Wilson deduced there are potentially an infinite number of universes based off the quantum many worlds interpretation with an explanation by quantum reports [178]. Both disagree with the idea of a deity finetuning the

universe suggesting how humans just perceive the universe as made for humans because humans have evolved to suit the universe. Any universe unfit for life would mean a conscious being could not observe that universe to exist giving observer bias of every universe observed is therefore fit for life. Douglas Adams' puddle analogy illustrates the idea where a puddle believes the hole was perfectly made for it but that is just because it can adjust to fit the hole.[179]

Secondly, scripture is potentially considered an unreliable source against science by some critics. Scripture has no evidence on origins of the universe other than what has been passed down from the Word of God. Religions such as Christianity have origins from Judaism which in turn stems from the Old Testament. This was written by prophets and their holy experiences. The Bible is described to be written by God through humans in the bible.[180] Some critics suggest that as human's are still involved writing down the scripture means that messages potentially are corrupted. Religion also claimed existence of miracles or divine intervention. Bible Miracles have not been observed in the same comparable ways for 2000 years. This can bring criticism to scripture. Since the advent of science and the media it is arguable that it was just events that a population could not cross validate so were forced to accept their existence. Furthermore, without proper documentation (absence of recording technology) with little education and scientific knowledge, miracles are so extraordinary that eyewitness testimony is a misunderstanding of the event occurring, like a modern magician. Wallace suggested that there were plausible alternative descriptions for events and not every anomaly is divine intervention.[181] Religion has been suggested to be a natural response amongst humans. Human nature looks for hope and faith provide that. Pascal Boyer suggested that the psychology of the brain provides religion as a natural response.[182] This can be seen in tribes individually discovering unique unrelated religions independently. This suggests a way religion can originate without the need for credible evidence. This

[176] Overview of Christianity | Equality, Diversity & Inclusion (09/02/2026)
[177] Albert Einstein Quotes - 627 Science Quotes - Dictionary of Science Quotations and Scientist Quotes(10/02/2026)
[178]https://eprints.whiterose.ac.uk/id/eprint/224301/7/Wilson_2024_J._Phys.__Conf._Ser._2877_012080.pdf 22/02/2026
[179] https://www.goodreads.com/quotes/70827-this-is-rather-as-if-you-imagine-a-puddle-waking 19/02/2026
[180] Jeremiah 1:9 (ESV): "Then the Lord put out his hand and touched my mouth. And the Lord said to me, 'Behold, I have put my words in your mouth'"
https://www.google.co.uk/books/edition/Miracles_and_Modern_Spritualism/eyoz5ZV8S18C?hl=en&gbpv=1&dq=argument+against+miracles&pg=PA46&printsec=frontcover 19/02/2026
[182] https://cdn.centerforinquiry.org/wp-content/uploads/sites/29/2004/03/22164659/p25.pdf 18/02/2026

means Atheists would argue religious texts are a less reliable source for the origins of the universe.

However, those arguments cannot disprove religion especially on origins of the universe. Theologians argue religion uniquely addresses how there is existence. Scientific Laws such as the conservation of Mass suggest that matter had to originate from somewhere. This means there had to be a cause to bring this matter to existence. A deity would be eternal and capable of creation of the universe. This shows religion can answer questions about our universe without using empirical evidence. Secondly, science does not have the methods to definitively disprove religion. Disproving all of religion entirely is not plausible due to the nature of religion describing the supernatural. Therefore, science can only suggest it is unlikely or that it has no empirical evidence. Completely dismissing multiple individual eyewitness testimony of miracles is difficult to definitively disprove. Suggesting the entire convention of religion is incorrect requires strong evidence due to religion's large size. Science is used to describe the natural world around us which it is highly successful in. Physics uses mathematical models to describe the natural world based off collecting empirical evidence. Dr. Christian Maduabuchi Umeanwe suggests that science only describes the natural world.[183] Religion describes the supernatural which cannot be described by science. Therefore, use of scientific patterns to disprove supernatural events is not possible especially without a theory of everything within science.

Finally, some concepts in physics are consistent to religion showing how science is not contradictory and therefore science and religion can co-exist. Such as the idea of Pre-destination in faiths such as Christianity, Judaism and Islam is consistent with what physics predicts. It suggests that if one possessed the knowledge of all interactions then the exact future could be predicted, unfortunately humans have a limit as with our current understanding it is impossible to predict outcomes due to inherent randomness of the quantum world. However, with divine power it is possible that a deity could know everything that has happened and will ever happen. It has been theorised that the big bang was even the start of space and time making the origins of our universe even more mysterious. Furthermore, the model of the big bang is consistent with the religious concept *ex nihilio* (from nothing) idea of creationism and how the universe was created from nothing. Also, here is the argument that the finetuning of universal constants that suggests there is a creator. It is theorised that if any of these constants are off by a small percentage then there is an inability to form some of the organic molecules that exist. More importantly, as suggested by Geraint F. Lewis and Luke A. Barnes the universe would not be able to form such a complex and diverse universe, the universe would be homogenous lifeless structure.[184] Furthermore, without evidence that there are other universes following different fundamental scientific rules it would suggest that this type of universe is the only one to exist hence could seem surprising it is the only inhabited universe. This could be interpreted that there is a deity who has created the universe for us to exist.

In conclusion, the supernatural elements lie beyond the scope of empirical investigation by science. Religion does not have empirical evidence to demonstrate its beliefs which can make it difficult to justify and build scepticism. However, with the complete theory on the origins of the universe being a mystery to science, religion may offer solutions that use supernatural mechanisms that cannot be disproved by science.

[183] EXPLORING THE INTERSECTIONS OF FAITH AND REASON: CHALLENGES AND OPPORTUNITIES FOR INTEGRATING RELIGION AND SCIENCE | AQUINO | Journal of Philosophy 19/02/2026

[184] Cosmological fine-tuning: the view from 2025 | Religious Studies | Cambridge Core 10/02/2026

Are we at a point where Metal-Organic Frameworks can be used for large-scale carbon capture?

By Gregory B

There are strong convictions for both sides of this question as Metal Organic Frameworks (MOFs) are useful in Carbon Capture because they have the ability to selectively trap CO2 using less energy than traditional methods due to properties which will be explored in this Article. Issues regarding this useful characteristic are the poor stability - particularly in the presence of moisture or contaminants, leading to consequential issues such as high production costs. MOFS are a new material which is strikingly relevant to a 21st century society due to their applications in areas of critical importance to society on a global scale such as energy, the environment and biomedicine. They are porous solids with a structure consisting of single ions or clusters that are bridged together by organic linking groups to form a coordinated network. Their applications are a direct result of their extraordinary surface areas and finely tuneable pore surface properties.[185] This is important because only 46 Mt of 37Gt or 0.1% CO2 emitted in 2022 was captured and so developments in the field are fundamental in ensuring sustainable energy practises.[186] This article will argue that MOF's have useful and unique characteristics but that more development is required in both technology and policies for them to be viable and useful in industry.

Carbon Capture is critical in ensuring sustainable industrial practises because in many industries, economic prosperity is heavily dependant on the exploitation of fossil fuels due to them being considerably inexpensive in comparison to more modern sustainable methods, especially when carried out in low-income countries such as those in the Middle East due to being relatively inexpensive compared to renewable technologies.[187] For example, in Qatar, tariffs are heavily subsidised and corporate tax is reduced hence energy costs $0.032 USD/kWh compared to an exorbitant $0.403 USD/kWh in the United Kingdom hence companies are more likely to take advantage of cheap fossil fuels for energy to increase their profits.[188] [189] [190]

Current Carbon Capture, Utilization and Storage (CCUS) technologies have critical limitations as they incur an energy penalty of approximately 30% so there is a demand for optimised technology such as MOFs to reduce atmospheric pollutants and costs. Whereas other technologies designed with the intention to reduce carbon dioxide levels via fewer emissions into the atmosphere have observed steep cost declines over the last decade, CCUS technologies have seen comparatively more less progressive cost reductions[191]. As a result, economic problems are a restricting factor in the development of new carbon capture technology such as MOFs due to consistently high costs associated with capture, transportation, utilization and storage of CO2. The majority of CCUS projects find it challenging to make a profit, causing investors to lack motivation. To combat this, countries could establish funding for CCUS to incentivise economic engagement and should also establish favourable tax policies to assist projects in achieving a stable, positive profit margin.[192]

Metal-organic frameworks observe the most beneficial impact when used post-combustion due to a high selectivity for CO2 over N2 even in the presence of water vapour, which is of colossal importance in applications to flue gas where N2 is in a significantly greater proportion compared to CO2 at 76% and 13% respectively.[193] They are characterized by steep uptake curves of CO2 at low partial pressures and so are efficient in absorbing the low

185 *Chemical Reviews: Carbon Dioxide Capture in Metal-Organic Frameworks - Jeffrey Long* https://www.academia.edu/70931793/Carbon_Dioxide_Capture_in_Metal_Organic_Frameworks *(Published in 2012, viewed on 14/01/2026)*

186 *Applications of carbon capture in the energy transition* https://www.abnamro.com/research/en/our-research/applications-of-carbon-capture-in-the-energy-transition *(viewed on 27/01/2026)*

187 *A Systematic Review of Carbon Capture, Utilization and Storage: Status, Progress and Challenges – Enbin Liu, Xudong Lu, Daocheng Wang* https://www.mdpi.com/1996-1073/16/6/2865 *(Published on 20/03/2023)*

188 *Qatar electricity prices* https://www.globalpetrolprices.com/Qatar/electricity_prices/#:~:text=The%20residential%20electricity%20price%20in,prices%20paid%20by%20big%20businesses. *(viewed on 27/01/2026)*

189 *What Brits pay for electricity compared to other countries* https://uk.finance.yahoo.com/news/brits-pay-electricity-compared-other-163000142.html *(08/10/2024)*

190 *United Kingdom electricity prices* https://www.globalpetrolprices.com/United-Kingdom/electricity_prices/ *(Data collected in June 2025 and viewed on 27/01/2026)*

191 *Chemical Reviews: Carbon Dioxide Capture in Metal-Organic Frameworks - Jeffrey Long* https://www.academia.edu/70931793/Carbon_Dioxide_Capture_in_Metal_Organic_Frameworks *(Published in 2012, viewed on 14/01/2026)*

192 *Carbon capture and storage: costs, opportunity costs, economic viability and social returns* https://www.bbvaresearch.com/en/publicaciones/global-carbon-capture-and-storage-costs-opportunity-costs-and-profitability/#:~:text=Cost%20variability:%20CCS%20costs%20vary.hard%2Dto%2Dabate%20sectors. *(Report published 24/10/2025)*

193 *Flue gases properties table* https://www.pipeflowcalculations.com/tables/gas-fuel.xhtml *(viewed on 28/01/2026)*

proportion of pollutant present in flue gas. [194]Zeolites, which are an alternative CCUS technology, are more adept at absorbing pollutants at high partial pressures and are therefore not as efficient in capture of CO2 in flue gases and polluting sources. This means that despite the higher production costs of MOFs compared to zeolite, a smaller amount of MOF is necessary to achieve the same benefits, hence the gap in production costs is not as significant as it first appears. There are some MOFs that are designed with a focus on greater working capacity as oppose to maximum capacity, meaning that good cycling performance and energy-efficient regeneration are prioritized, exhibiting steep uptake curves.[195] Furthermore, MOFs outperform conventional CCUS materials, with absorption capacities of up to 26 wt% (weight composition) at high pressures so are able to take in a large proportion of carbon dioxide and other pollutants[196] [197]

The most significant drawback regarding Metal Organic Frameworks is their instability in real life environments, hence, they do not scale well and are inconsistent in their efficiency due to the strenuous cooling processes, relatively high costs, difficulties in quality control and risks regarding stability.[198] For instance, flue gas is a moist environment where MOF's tend to become unstable which can have a potent effect on performance and consequentially reduce the effect of metal-organic frameworks in carbon capture. Even MOFs that tolerate water face long-term stability challenges under acidic impurities such as sulphates and nitrates (SOx/ NOx) and so would have to be replaced once degraded, which is unlikely to be economically feasible in most cases. Additionally, the manufacturing methods involved in producing MOF's are often not environmentally sustainable, obstructing their purpose of reducing the environmental impact of carbon-based pollutants. Despite being an increasingly affordable option, these drawbacks may cause major polluting corporations to opt for traditional zeolite catalysts because they are still a considerably more economical method of carbon capture and therefore, in many cases, could be favourable.[199] [200]

Currently, there are few cases of MOF's being used for any extensive industrial carbon capture, however, there are some companies trying to introduce this technology into mainstream industrial principles, for instance, the UK company, *Promethean Particles* specializes in the design and production of innovative MOF material specialised for applications in CO2 capture intended to make reduced CO2 emissions an achievable goal for a variety of industries.[201] It is essential that CCUS technologies develop to a point where they can be used viably and sustainably for large-scale capture of carbon-based pollutants because limiting emissions of CO2 via sustainable energy sources is not enough alone to reach net zero carbon emissions by 2050 and stay <2°C above pre-industrial temperature levels.[202] For this to be done at an optimal industrial scale, the costs of both the technology and technique associated with synthesis of metal-organic frameworks must be alleviated. One proposed improvement in the synthesis of MOF's is to utilise microwave technology as an alternative heating method for the preparation of the unique material due to uniform heating and remarkably reduced synthesis times from hours to seconds, hence leading to a decrease in energy consumption which in consequence, arguably makes MOF's viable and effective in CCUS.[203] [204] The profitability of carbon capture could be improved by increasing CO2 prices in carbon markets such as *EU ETS*, to encourage companies to decrease their emissions, making materials like metal-organic frameworks more competitive.[205] Additionally, collaborations between MOF developers such as *Promethean Particles* and industrial partners could allow for larger-scale, real-world testing that can be mutually beneficial and identify the best solutions for managing costs for optimal efficiency and profit, incentivising development and investment.

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[194] *Reversible coordinative binding and separation of sulphur dioxide in a robust metal-organic framework with open copper sites - ORCA – Online Research @ Cardiff* https://orca.cardiff.ac.uk/id/eprint/126620/1/revisedmanuscriptbeforepublication.pdf *(Viewed on 29/01/2026)*

[195] *Metal-organic frameworks with high working capacities and cyclic hydrothermal stabilities for fresh water production* Metal–organic frameworks with high working capacities and cyclic hydrothermal stabilities for fresh water production - ScienceDirect *(15/02/2016, viewed on 29/01/2026)*

[196] *Chemical Reviews: Carbon Dioxide Capture in Metal-Organic Frameworks - Jeffrey Long* https://www.academia.edu/70931793/Carbon_Dioxide_Capture_in_Metal_Organic_Frameworks *(Published in 2012, viewed on 14/01/2026)*

[197] *Recent advances in gas storage and separation using metal-organic frameworks – Hao Li, Kecheng Wang, Yujia Sun, Christina Y. Lollar, Jialuo Li, Hong-Cai Zhou* https://www.sciencedirect.com/science/article/pii/S1369702117302407 *(March 2018, viewed on 25/01/2026)*

[198] *Chemical Reviews: Carbon Dioxide Capture in Metal-Organic Frameworks - Jeffrey Long* https://www.academia.edu/70931793/Carbon_Dioxide_Capture_in_Metal_Organic_Frameworks *(Published in 2012, viewed on 14/01/2026)*

[199] *Realising the environmental benefits of metal-organic frameworks: recent advances in microwave synthesis Ieuan Thomas-Hillman, Andrea Laybourn, Chris Dodds, Samuel W. Kingman* https://pubs.rsc.org/en/content/articlepdf/2017/sc/c8ta02919a *(Published on 22/05/2018, viewed on 18/01/2026)*

[200] *Metal-organic frameworks for carbon dioxide capture – Claudio Pettinari, Alessia Tombesi* https://www.academia.edu/56993196/Metal_organic_frameworks_for_carbon_dioxide_capture *(28/07/2020)*

[201] *Carbon dioxide capture in metal organic frameworks – Revolutionizing Climate Solutions* https://prometheanparticles.co.uk/carbon-dioxide-capture-in-metal-organic-frameworks/ *(viewed on 28/01/2026)*

[202] *Applications of carbon capture in the energy transition* https://www.abnamro.com/research/en/our-research/applications-of-carbon-capture-in-the-energy-transition *(viewed on 27/01/2026)*

[203] *Realising the environmental benefits of metal-organic frameworks: recent advances in microwave synthesis Ieuan Thomas-Hillman, Andrea Laybourn, Chris Dodds, Samuel W. Kingman* https://pubs.rsc.org/en/content/articlepdf/2017/sc/c8ta02919a *(Published on 22/05/2018, viewed on 18/01/2026)*

[204] *Microwave-assisted continuous flow synthesis of mesoporous metal-organic framework MIL-100 (FE) and its application to CU(I)-loaded adsorbent for CO/CO2 separation* https://www.sciencedirect.com/science/article/abs/pii/S0254058420306489 *(Published on 01/10/2020, viewed on 22/01/2026))*

[205] *EU Emissions Trading System* https://climate.ec.europa.eu/eu-action/carbon-markets/eu-emissions-trading-system-eu-ets_en *(viewed on 29/01/2026)*

Ultimately, metal-organic frameworks are an outstanding material for sustainable carbon capture due to their high selectivity for CO2 over N2 and their porous structure which is designed specifically for absorption. However, they are not yet at a point where they are viable or efficient on a large scale primarily as a result of stability issues and costs associated with their production. Alternatively, metal-organic frameworks are suggested to display equally significant impacts in the purification of hydrogen for fuel cells, improving the production of this sustainable energy source, reducing emissions.[206] Hence the focus on MOF's should perhaps not be restricted only to carbon capture if they are to have the greatest positive influence on the earths climate and environment. In 2025, the Nobel Prize in Chemistry was presented to three scientists for their contributions towards the development of metal-organic frameworks, which spotlit their potential for constructing a future where we have cleaner energy and greater control over emissions.[207] As a result, the future looks positive for the research and development of metal-organic frameworks, and it is likely to be less than a decade before we see them being used regularly in industrial applications, especially if the correct policies and partnerships are introduced.

[206] *Breakthrough material captures industrial gases twice as efficiently – Sarah C. P. Williams https://chemistry.berkeley.edu/news/breakthrough-material-captures-industrial-gases-twice-efficiently (Published 20/11/2025 and viewed on 28/01/2026)*

[207] *Nobel Prize in Chemistry 2025. NobelPrize.org. Nobel Prize Outreach 2026. Wed. 28 Jan 2026. https://www.nobelprize.org/prizes/chemistry/2025/summary/ (Viewed on 28/01/2026)*

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EXPLORING BIG QUESTIONS & IDEAS

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