LIKE, LITERARY

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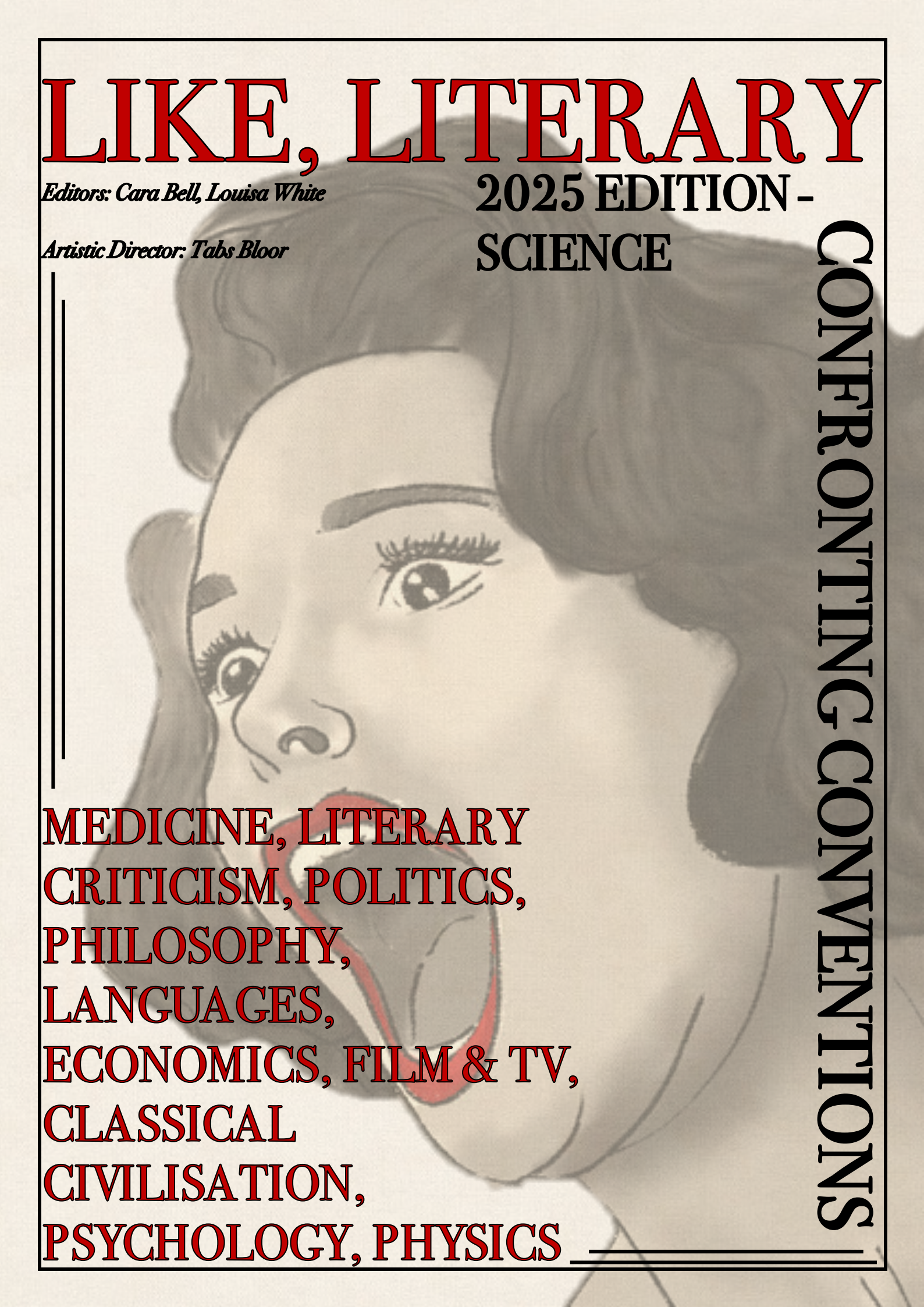
Artistic Director: Tabs Bloor

2025 EDITION - SCIENCE

CONFRONTING CONVENTIONS



MEDICINE, LITERARY CRITICISM, POLITICS, PHILOSOPHY, LANGUAGES, ECONOMICS, FILM & TV, CLASSICAL CIVILISATION, PSYCHOLOGY, PHYSICS

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FOREWORD

The power of the written word is a well-established trope. Perhaps the most famous (and arguably over-used) phrase "The pen is mightier than the sword", taken from an early 19th century play but reflecting a sentiment echoed by writers for centuries, suggests the physical impact that words can have. Personally, I prefer the sentiment evoked by the Roman poet Horace in the final poem of his third book of Odes, in which he states: "exegi monumentum aera perennius" ("I have built a monument more lasting than bronze"). For him, the power of his poetry was its perpetuity. The everlasting status of our words is perhaps even more pertinent in the modern age, when the internet has created a vast stockpile of information, some of which perhaps doesn't deserve immortality!

The articles in this edition, covering such a wide range of interesting and relevant topics, certainly do merit such lofty status and will certainly stand the test of time. They also demonstrate how passionate the writers are about their individual and varied topics. I invite you all to read and enjoy!

- Mrs S. Capewell
Head of School

"Writing allows us to turn words into things, to freeze them in time and space" – Thomas Eriksen, Norwegian Anthropologist

Conventions act as invisible strings that weave together traditions, genres and expectations; they give us structure rhythm, and a foundation upon which to build. Literature not only thrives in following these conventions but also in bending, breaking, and reimagining them as our global society aims to advance. The 2025 edition of 'Like Literary' intends to explore the liminal area between literature and the fluctuating factors that craft the lens through which we view it. In reinterpreting our preconceived bias, ingrained stereotypes, and accepted norms, we have aimed to make a collective commentary on the evolution of our human community. It is this exploration that ultimately led us to the title 'Confronting Conventions', a broad theme which has allowed our diverse sections, led by passionate individuals, to flourish. They have delved into a diverse evaluation of how society's rules have influenced it for the better or worse throughout time, and perhaps how this could evolve in the next generation. As editors, we hope that this year's edition of 'Like Literary' will draw attention not only to existing conventions but also bring awareness around reinforcing stereotypes or perpetuating a misguided perception, and the impact that it can have. This edition should serve as a reminder that our global society is vastly distinct in its culture and stages of growth and encourage us to look beyond a bubble of advantageousness that is all too often taken for granted. We would like to thank all of the section editors and contributors to this year's literary magazine for their tireless dedication and effort put into this project, with particular gratitude to the artistic director Tabby Bloor, who has brough our collective vision to life, and Mrs Roberts, who has facilitated and coordinated our efforts, without whom we could not have constructed this unconventional magazine.

- Cara Bell and Louisa White
Co-Editors

MEDICINE

"Medicine is what heals us, what allows us to delve into the depths of the human body. It is perhaps the thing which continually defies conventions, pushing the boundaries of technology and innovation, enabling us to discover hope and new solutions. The feats that can be achieved are monumental, from preventing the body from destroying itself, to finding a way to restore immunity. The ethical, technical and economic challenges which this field is so regularly confronted with, is what makes medical advances so awe-inspiring. These articles are an exploration of the many regions of medicine, elucidating how it is constantly evolving, so let them educate and inspire you."

-Tabby Bloor, Lower Sixth
Section Editor

Beyond Borders: Medicine's Ethical Issues Around the World

Noor Farooq

Medicine is a universal need which has been shaped by diverse economic, political and cultural influences around the world. While healthcare has transformed millions of lives over the last century, many people still face systemic barriers to accessing medicine and treatment in our modern society. Whether it is the right to abortion, the ethical debates surrounding euthanasia, or the inequalities in the availability of medical research and treatment available, each ethical issue highlights the ongoing struggles for justice and human rights in healthcare today.

Euthanasia is the deliberate act of ending a life in order to relieve pain and suffering, usually for a terminally ill patient, and it remains one of the most controversial ethical debates in modern medicine. Many countries across Europe, including the UK, prohibit euthanasia entirely, arguing that legalising it could lead to abuse and could pressure vulnerable patients to end their lives. Furthermore, many religious denominations, following the teachings of Saint Thomas Aquinas, argue that life must be preserved in accordance with the primary precepts, to maintain the sanctity of life; this is the belief that life is sacred, a gift from God, and should be protected. Opponents also raise concerns with doctors, arguing that by allowing euthanasia, they are contradicting the fundamental medical duty to preserve and save lives.

Contrary to this belief, countries such as the Netherlands, Belgium and Canada permit voluntary euthanasia under strict medical guidelines, reasoning that a patient's autonomy, one of the four medical ethics, gives them the right to die with dignity. Even being legalised in these countries, there are strict regulations and eligibility criteria that have to be passed, causing approval processes to take months.

In countries where it is illegal, patients often seek assistance from loved ones, and this exposes them to unsafe and unregulated methods, sometimes even causing immense pain and human rights violations. Overall, there are many ongoing debates about whether euthanasia should be legalised in medicine, raising difficult questions on how to balance medical responsibility whilst preserving an individual's right.

Abortion is the termination of a pregnancy for medical, ethical or personal reasons and it remains one of the most debated topics in healthcare today. Countries such as England, Canada and Sweden allow abortion under certain regulations, emphasising that autonomy, maternal health and reproductive rights are all personal matters concerning the individual carrying the baby, and therefore the decision should lie with them rather than the state.

In contrast, countries such as El Salvador, Malta and the Philippines impose very strict bans on abortion, often due to religious and ethical beliefs, arguing that the sanctity of life is of utmost importance. Some Catholic countries also believe that life begins at conception and because of this, abortion is impermissible as it is seen as taking a life appointed by God. Furthermore, these countries argue that abortion violates the fundamental medical duty to protect human life and therefore should be illegal.

However, banning abortion does not prevent it entirely but rather drives women to seek unsafe methods, whether it be by unregulated backstreet clinics or dangerous self-induced methods. This increases the many risks of severe infections,

damage to the womb, excessive bleeding, and even death. This is a repeated problem, dating back to the 1930s, and by constantly denying the right to abortion, it only makes the procedure more dangerous, compelling people to resort to unsafe alternatives.

Harsh abortion laws have sparked ongoing ethical debates surrounding the issues of reproductive rights and gender equality in healthcare. Supporters argue that denying access to safe, legal procedures disregards a woman's autonomy and forces them into potential life-threatening situations. In contrast, opponents of abortion argue that the unborn baby should be equally protected and have the right to live, as it still constitutes a human life. This divide raises global discussions regarding medical ethics, human rights, and the role of healthcare in balancing moral responsibility and the right to choose.

In many underdeveloped countries around the world such as Haiti, Ethiopia and Somalia, access to basic healthcare for the majority of the population ranges from very limited to almost non-existent, creating a significant ethical challenge for global medicine. Without proper healthcare infrastructure such as hospitals, maternity units and clinics, patients face severe consequences from a lack of adequate treatment and medical attention. This can cause or accelerate spread of disease, infections, and unnecessary suffering.

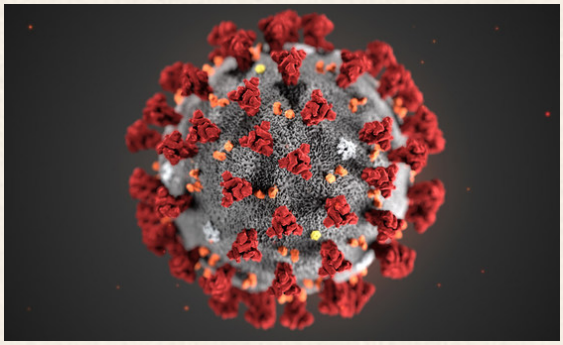
For example, women in rural areas have limited access to maternity services, causing unsafe childbirths to occur which results in higher rates of infant and maternal deaths. The absence of healthcare violates the right to health and also one of the four ethics of medicine: justice. Inequalities arise due to how wealthier countries have more accessibility to medicine and treatment. The ethical dilemma lies in the contrast between wealthier nations where advanced healthcare is readily available as compared to vulnerable populations, where healthcare is deemed as a luxury which only very few can afford. Although the wealthiest people in countries such as Haiti and Ethiopia can afford access to quality healthcare, the majority of the population cannot, causing a significant divide in society.

However, many wealthier countries such as the UK and the United States offer international support to poorer countries in the form of healthcare aid, funding and humanitarian programs. An example of this is the GAVI Alliance which provides immunisation to children in low-income countries, vaccinating them to prevent the spread of disease and ultimately death. By providing such support, wealthier nations help ensure that everyone, regardless of their birthplace or economic status, has the right to essential medical care.

The availability of medical research and advancements in treatment varies significantly across the world, with some countries having advanced knowledge in treatments of diseases while others lack access to basic healthcare innovations. This divide is primarily driven by economic disparities and political instability. Many less developed countries face harsh challenges in advancing medical research due to how they lag behind in acquiring treatments and therapies that could help improve public health.

In some areas, the lack of research has led entire populations to be vulnerable to preventable diseases. For example, countries such as Zimbabwe and Afghanistan suffer from a lack of advanced research in vaccine development, preventing them from effectively combat infectious diseases such as malaria and tuberculosis. This creates an ethical dilemma, as populations are affected by diseases which could be easily managed or eradicated if only there was more knowledge about vaccinations. In contrast to this, wealthier countries such as the United States and the UK have more access to medical research and funding, causing them to develop and distribute new treatments at a much faster rate compared to less fortunate countries. This issue became more prominent during the global health crisis of the COVID-19 pandemic, where some countries were able to secure vaccinations and treatments faster than others, saving themselves and protecting their nation. Unfortunately, countries that were not able to obtain vaccinations and developments faced harsh realities, causing the virus to spread widely and more permanently damaging the economy. An example of this is India, where the country was severely impacted by COVID-19 as a result of a shortage of vaccinations during the early stages of the

pandemic. This has had a domino effect on the economy due to how the wide-spread lockdowns resulted in major disruptions to businesses and a sharp decline in exports, as well as significant reductions in workforce availability.



This growing divide in access to medical research raises serious ethical questions about justice and human rights. The disparity highlights the inequalities between countries who are underdeveloped and encourages wealthier nations to provide support in order to contribute to a more equal and fair global healthcare system. We must promote the notion that every individual, regardless of who they are and where they come from, should have access to medical advancements that could save their lives.

The ethical challenges surrounding healthcare, from access to medical research to the right to make personal health decisions, continues to divide populations across the world. The issues highlight the need for greater international cooperation in order to emphasise how healthcare is a right, not a privilege. It should be accessible to everyone, with the individual able to make autonomous healthcare decisions to provide justice and equality within the field.

Do Regulations Stifle Creativity?

Tabby Bloor

To make a discovery is sometimes to bend the rules, to not let failure discourage you, and to persevere. Throughout history, medicine and treatments are constantly evolving and changing as breakthroughs are made, and theories once thought to be fact are discredited. To prevent malpractice, or abuse of power, boundaries and rules are imperative. Whilst they're vital to protect patients, are they perhaps inhibiting medicine from advancing by impeding vital research from taking place? There is a fine line between having a lack of monitoring, and overbearing rules, and to know where this line is, is often unclear and indistinct.

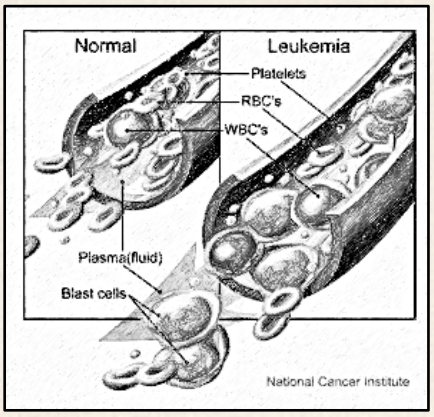
The regulation, approval requirements, and control of what can be done in terms of medical research can be viewed as a constraint, preventing people from making significant discoveries. A prime example of this is E. Donnall Thomas, who most likely would not have been able to achieve what he did in today's society, which was an instrumental discovery in the treatment of leukaemia.

E. Donnall Thomas

'We owe it to our patients to do better.' – E. Donnall Thomas

Leukaemia is a blood cancer which occurs when white blood cells become cancerous. At a time when it was seen as a death sentence, Don Thomas, a young intern doctor, had a spark of motivation and interest to look in another direction, to find another way to treat the vicious and fatal disease.

Initially, Thomas theorised that by transplanting bone marrow from one individual to another, you would essentially be transplanting their entire immune system: allogeneic bone marrow transplantation. This is because the bone marrow contains hematopoietic cells; cells which are capable of developing into all types of blood cells, and therefore through transplanting bone marrow the recipient would then be able to produce new, non-cancerous, white blood cells, providing them with immunity.



The initial stages of making a discovery in the 1950's were completely different to nowadays. In Thomas's case, he was able to begin testing with 6 desperate volunteers on the brink of death. He was not alone in this daunting first trial; he worked alongside Joe Ferrebee, and together they intravenously infused bone marrow (from anywhere they could get it, including a volunteer co-worker, a patient undergoing a separate procedure, and a recently deceased patient). Lacking any direction or knowledge, Thomas and Ferrebee went into this trial essentially blind, not knowing whether it would work, which marrow to give to each patient or even the effect the transplant would have. Unsurprisingly, it resulted in a 100% mortality rate, with only one patient showing a fleeting sign of engraftment.

Nowadays, to conduct a clinical trial, before it can even begin it must go through rigorous phases of approval including a peer and ethics review, trial authorisation, and hospital authorisation. Having these assessments, and a strict authority means that recipients of drugs, or treatments being tested are protected, and the trial will be as safe as possible. Whilst this is the responsible course of action, if these same standards were in place 70 years ago, Don Thomas would not have been able to continue conducting research, owing to the fact his initial trial lacked any solid foundation and resulted in all participants dying. Should his theory have been seen as too radical and far-fetched? Should his experiments have been more closely

assessed and regulated? Perhaps, but then again if that were the case the treatment of leukaemia and various other diseases may not be as effective as they are today.

Obstacles are ever-present in the research process, and today researchers and scientists are aided with technologies, and the knowledge of researchers before them. However, in Thomas's case, not only did he lack the technology readily available today, but there was a significant lack of any research being done or even associated with what he was theorising. Driven by determination and a strong will, Thomas was truly committed to proving his theory, and establishing bone marrow transplantation as a viable treatment option. Aided by grants, a loyal team, and lenient regulations, he was ultimately able to do so, however if his research was attempted today, it'd more than likely be stopped.

In October 1990, Don Thomas and Joseph Murray won the Nobel Prize 'for discoveries concerning organ and cell transplantation for the treatment of human diseases. The discoveries they made were monumental in not only treating leukaemia, but many types of cancers, anaemia's, and even monogenetic immune deficiencies, and were the foundations of what would be and still is revolutionising medicine: adoptive cell therapy (essentially where our own immune cells are isolated, activated, expanded, then reinfused). From starting with random marrow cells, this treatment has progressed to the point where marrow cells can be HLA typed (matching the protein markers found on cells) and matched specifically to people, and this may not have been possible without the instrumental research which Thomas conducted. With current regulations in medical research, achieving this feat would be simply impossible, and this forces us to question whether regulations are hindering scientists from making crucial discoveries.

In a more recent discovery, it became evident that the narrow-mindedness of people may be a significant barrier to medical advancements. For years, it was conventionally believed that stomach ulcers were caused by stress and lifestyle factors. However, two doctors believed otherwise. Despite facing criticism, adversity and scepticism, their discovery of Heliobacter Pylori demonstrates the importance of remaining open to new ideas and theories.

Heliobacter Pylori

Peptic ulcer disease (PUD) is where there are open sores on the inner lining of both the stomach and upper small intestine, and until the1980's the cause of it was completely misunderstood.

From the 19th Century, the cause of PUD was a topic of debate; the theories were that it was either an excess of acid in the stomach or had a bacterial cause. Despite this, in the mid 20th Century, the bacterial hypothesis was abandoned, and all efforts and treatments were directed toward achieving a 'chemical balance' in the stomach. Both original hypotheses lacked proof, however, unluckily the worse one was conventionally believed to be true, leading to decades of mistreatment for PUD. One reason for this stemmed from a study conducted by Palmer (a notable gastroenterologist) in 1954, in which he observed 5 patients with gastrointestinal complaints. He had concluded that they all lacked a presence of bacteria (and the theory was soon discarded), however unbeknownst to Palmer, his method would not detect spiral-shaped bacteria, the shape of the bacteria causing PUD H. Pylori. In addition, in the mid-20th Century, greater emphasis was placed on psychological causes such as stress, reinforcing and consolidating the incorrect belief of the causes of PUD.

Nevertheless, the erroneous information concerning PUD which had pervaded the medical industry would soon be challenged.

At the Royal Perth Hospital, Dr Robin Warren worked as a clinical pathologist, and Barry Marshall as a trainee doctor. Warren would regularly examine numerous stomach biopsy specimens, and in doing so, he began to observe a correlation between the number of bacteria in the sample and the severity of inflammation. This relationship between bacteria and PUD was not a new theory, having been proposed in the 19th Century, however, it still lacked the necessary proof to replace the prevailing belief, that stress or excess stomach acid was the cause of PUD. Having observed the connection in stomach biopsies, Warren and Marshall began attempts to culture the bacteria and present proof of this link, however, this was harder than anticipated. After countless

attempts, Warren and Marshall finally succeeded, and they obtained a culture of the bacteria they sampled from the biopsies, but despite this, they still lacked proof that the bacteria were the root cause of the inflammation. To tackle this obstacle, Marshall took matters into his own hands and swallowed a sample of the culture.

Marshall's act could be interpreted as an extreme sign of dedication to his belief. On the other hand, perhaps it is also clearly proving that the medical community can be so rigid, adamant, and obstinate in their views and beliefs, that they can lack openness to new ideas and theories, resulting in people, such as Marshall, resorting to extreme and radical measures to be recognised. Certain treatments, assumptions, and beliefs may be widely and conventionally accepted in medicine; however, this should not act as a barrier to new discoveries or hypotheses.

The result of Marshall consuming the culture sample was that he developed gastritis. Shortly after, he underwent a gastric biopsy, which showed the presence of Heliobacter Pylori. In 2005, Marshall and Warren were consequently awarded the Nobel Prize 'for their discovery of the bacterium Heliobacter Pylori and its role in gastritis and peptic ulcer disease'. The struggles undertaken to prove the existence of H. Pylori are yet another example of how conventional beliefs can have too strong a hold on the medical community, impeding their willingness and openness to welcome and embrace new theories and discoveries which may be instrumental for the advancement of medicine.

On the other hand, strict regulations are imperative to ensure patient protection, and to confirm the necessity and validity of a trial. Breaking them can have dire consequences for participants in trials, and repercussions for the researcher, which was seen in a breast cancer trial using a much more aggressive approach, led by Werner Bezwoda.

Werner Bezwoda

At the 1999 American Society of Clinical Oncology meeting, Werner Bezwoda presented his unique trial, assessing the efficacy of high-dose chemotherapy in metastatic (where cancer cells have spread from their place of origin to another part of the body) and high-risk breast cancer. Bezwoda presented that patients were treated with two-cycles of high-dose chemotherapy and an autologous stem cell transplant (where your own healthy stem cells are removed then reinfused after treatment), and that his subsequent results were amazingly successful. Previously, there had been a lack of trials to show the advantage of high-dose chemotherapy in treating (primary and metastatic) breast cancer, versus regular chemotherapy, making his results appear distinct and promising in the future treatment of breast cancer.

Despite the optimising results, this was no revolutionary discovery, which would soon be realised when a team of US oncologists did a data review in preparation for future studies based on Bezwoda's results.

From his presentation at ASCO, Bezwoda proclaimed that there'd be 90 patients in the metastatic trial, 151 in the high-risk trial, and 57 in the high-dose chemotherapy (from the high-risk group). The review of the results, which were not obtained easily with Bezwoda and his team refusing repeatedly to give up certain data, revealed only 20 out of 58 patients to have fully documented eligibility. This is only part of this fraudulent trial which lacked the necessary strict regulation and assessment to undergo, resulting in most of a group being partially undocumented and potentially ineligible, falsifying results, and removing the validity of the trial.

However, the lack of documentation for patients was not the only problem with the trial.

It was found that there were no records to show Bezwoda's study had ever been submitted for review and approval, which was required by his universities policy, meaning his entire trial, irrespective of the falsification of documentation

and the misinformation was fraudulent. The lack of attentiveness, investigation, and examination surrounding Bezwoda's trials allowed him to administer high-dose chemotherapy, something extremely potent and dangerous, to a group of women whom it may not have been necessary or the right course of action for, potentially endangering them. Furthermore, after assessing the follow ups on patients, it was found that 7 patients had relapsed, and were referred to terminal care elsewhere with no follow-up and owing to the usual nature of metastatic cancer most likely died, something else Bezwoda failed to put in his abstract or presentation.

Almost every part of the trial, from the drugs administered, to the eligibility of patients and outcomes, were falsified and fraudulent, yet this was not recognised until the trial was over, and the damage had already been done to these victims. Unlike Don Thomas, or Warren and Marshall, Bezwoda and his utter imprudence concerning his trial vitally needed supervision, intervention, and ultimately termination; he needed rules and regulations.

There is a delicate balance between enforcing rules gently or strictly, ensuring they don't impede a researcher's ability to make ground-breaking discoveries, whilst also protecting patients, and preventing malpractice or fraudulence. It can be difficult to navigate exactly where a line should be drawn to serve in the best interest of both patient and scientist, but as research continues, we can only hope it is in the right place.

Tradition vs Innovation – The Conventions Shaping Modern Surgery

Amelie Joubert

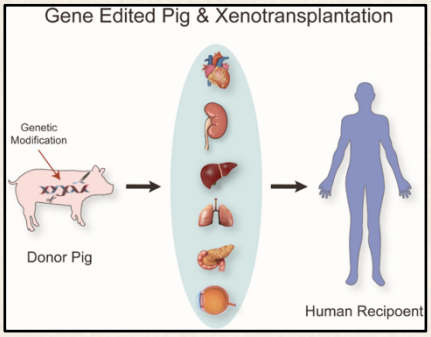
The history of surgery has always been a negotiation between established tradition and the drive for innovation. From early procedures performed without anaesthesia, before the mid-19th century when it first came into practice in the UK, to Joseph Lister's antiseptic breakthrough of the 19th century, surgical practice has long been shaped by trial, error and refinement. However, as medicine advances, so does the tension between entrenched methods that prioritise safety and ground-breaking techniques that ensure new possibilities – but often at a cost. Does adherence to convention safeguard recklessness, or does it just risk stagnation? As experimental procedures push the boundaries of medical ethics, and the concept of informed consent grows ever more complex, modern surgery finds itself in a constant balancing act – one where it's an ongoing debate between playing it safe or taking the risk.

The introduction when roughly was this widely introduced of surgical draping – sterile drapes that provide a physical barrier to prevent the contamination of the surgical field – and personal protective equipment (PPE), such as gloves and gowns, established sterile barriers that prevent contamination – practices are now so fundamental that they are second nature to every surgeon. Even the structured division of surgical roles, with a lead surgeon, assistant, scrub nurse, and anaesthetist

each performing designated tasks, ensures precision and efficiency in the operating theatre.

These lessons, written in blood and experience, form the backbone of modern surgical practice. All approaches today are guided by the successes and failures of those who came before. Innovation may push medicine forward, but without tradition, surgery would be chaos.

Boundaries are put in place to ensure the safety of the patient as well as the provision of effective and ethical care. However, these boundaries must be pushed to their limits when the potential benefits seem to outweigh the consequences. This has long been the case in xenotransplantation—one of the most controversial frontiers in surgical innovation that consists of the transplantation of organs or tissues from an animal source into a human recipient. In 1968, Dr Donald Ross attempted a pig-to-human heart transplant, a ground-breaking



procedure that was ultimately unsuccessful. Despite the failure, it did, in fact, pave the way for future research. Surgeons are having to navigate this uncharted territory increasingly more frequently as new technology advances to a greater level than ever before. This field embraces cutting-edge technology, like robotic assistance, where the precision is amplified, human error is reduced, and so patient outcomes improve. If successful, experimental surgeries save many lives.

Surgical progress does not come from blindly rejecting tradition, nor from resisting change. Instead, the most effective advancements occur when innovation refines and enhances established methods rather than replacing them entirely. However, not all new procedures prove beneficial; early trials of artificial organ transplants have faced long-term viability concerns, reminding the

medical world that progress must be measured, not rushed. For instance, using 3D printing in

surgical planning allows for better visualisation and preparation before the actual procedure by enabling surgeons to create patient-specific models of organs or tumours. This ingenious approach can lead to more effective surgeries. Nonetheless, it remains essential for surgeons to rely on their traditional training and experience to interpret these models accurately and make informed decisions. By blending this technology with established surgical knowledge, the medical field can continue to evolve while ensuring high standards of care for patients.

Surgical innovation brings the promise of life-saving breakthroughs, but it also raises difficult ethical challenges, particularly in relation to the four pillars of medical ethics: autonomy, beneficence, non-maleficence, and justice. The principle of autonomy ensures that patients give informed consent, yet in experimental surgery, fully understanding the risks can be difficult, especially for those in desperate situations. Beneficence, the duty to act in a patient's best interest, must be balanced against non-maleficence, the obligation to avoid harm. When the long-term effects of a new procedure are uncertain, how can a surgeon be sure that the benefits truly outweigh the risks? Lastly, justice raises concerns about fair access - cutting-edge surgeries are often expensive and experimental, accessible only to a select few before they become widely available, creating disparities in healthcare. Balancing progress with patient safety and fairness remains one of the greatest challenges in modern surgery, where the drive to push boundaries must always be met with ethical responsibility.

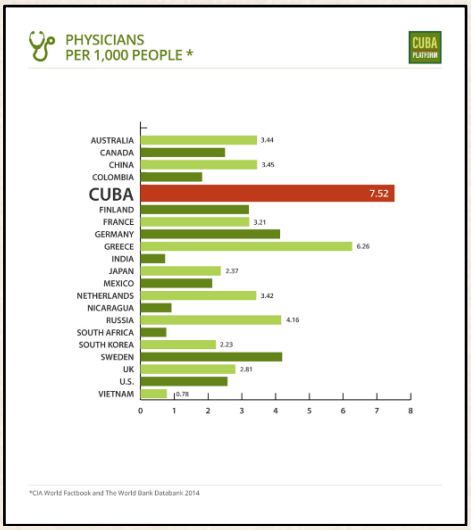
Every surgical advancement carries an element of risk, but how much is too much? The challenge lies in balancing the potential life-saving benefits of innovation with the dangers of the unknown. In the UK, the Medicines and Healthcare products Regulatory Agency (MHRA) and NHS ethics committees oversee new surgical techniques, ensuring patient safety before widespread adoption. However, some argue that excessive caution can delay progress, preventing patients from accessing potentially life-changing procedures. Take, for example, the early days of keyhole surgery – a procedure where surgeons use small incisions, often less than an inch, to insert a camera and specialised instruments to perform surgeries. Although once considered too risky, it is now standard practice due to its relatively fast recovery times and lower complication rates. Sometimes the risk must be taken, though. This was certainly the case for the first face transplant in the UK (2017). The idea was met with debate over long-term risks but ultimately provided a transformative outcome for the patient. While rigorous regulation is crucial to prevent harm, surgical history shows that calculated risk-taking often leads to breakthroughs that redefine medicine. The question remains: when does caution protect, and when does it hinder progress?

The history of surgery has never been a simple course of development, but one constant struggle between the desire to keep things familiar and venturing into the new. Familiar traditions bring safety and structure, yet the demands of innovation challenge them, moving medicine forward. But neither extreme - rigid tradition nor freewheeling innovation - can exist without the other. The future of surgery relies on judicious judgement, in which risks are being undertaken not in the interest of change but in the interest of true advancement. With newer technologies evolving and ethical issues growing more complex, the actual dilemma will not lie in adhering to convention or innovation but in identifying when to guard one and accept the other.

Conventions in Healthcare Systems Across the World

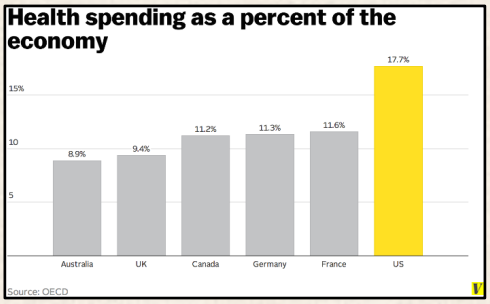
Christian Woodworth

What should healthcare look like? To most people, the answer seems simple: every action should benefit the patient and help them recover. In an ideal world, issues like cost, resources, and manpower wouldn't matter. Yet, we don't live in a utopia. Money, resources, and staffing dictate decisions - often at the expense of patients. The goal remains the same: improving quality of life. However, the path towards achieving it varies drastically across the world.



The first path is a dusty dirt road—humble, yet effective. This holistic approach treats issues at their roots, prioritizing preventative medicine and personal care over expensive interventions. Cuba exemplifies this model. Despite economic struggles - worsened by a U.S. trade embargo - it boasts a life expectancy far beyond what its resources would suggest, outperforming more economically developed nations against all odds. This approach is far from conventional. Cuba delivers a more community-focused service, eradicating problems before they even begin. Each doctor oversees around 150 patients - the highest ratio in the world - highlighting the power of a manpower-driven system.

Government pushes on issues such as vaccination have added weight to doctors' pleas. Treatment focuses on improving diet and lifestyle, so that problems rarely materialise. The Cuban medical system is widely accepted to be an exemplary model for poorer countries, with less money to spend and yet simply aiming to improve the quality of life for as many people as possible. PICTURE



A second path is that of the United States. A glass bridge - flashy and expensive - yet simultaneously weak and not accessible to all. The U.S. is renowned for its specialist treatments; for those seeking advanced medical procedures, it remains a top destination. Expensive cancer treatments, trial operations on tumours, you name it, the U.S. will provide it, so long as you are willing to pay. However, the US's huge medical resources are balanced out by their cost. Despite spending 18% of its GDP on healthcare, the U.S. provides free medical care to just 39% of residents. Unsurprisingly, the U.S. has dominated the market for costly treatments—driven by the immense profits they generate for providers. However, in doing so, it has neglected the less prosperous elements of society, being the only 1st World country to not have fully funded, government-provided care.
American healthcare providers often avoid addressing the root causes of issues. For example, obesity continues to rise because there's more profit in treating its symptoms than in preventing it. U.S. consumers spent $170 billion on obesity-related medical costs, whereas eating healthily can cost little more than a consumer currently spends. Even worse, obesity can lead to many other health issues, such as heart attacks, which place further strain on medical resources. Healthcare in the US is, by convention, defensive instead of aggressive, hiding from causes instead of targeting them.

The UK's path is a tightrope, floating high in the sky. Due to soaring costs, we are forced to adopt Cuba's holistic approach to save money. At the same time, we attempt to match the U.S. in medical breakthroughs and treatments. Residents here expect a high level of care - something the Cuban system cannot provide. The NHS teeters from crisis to crisis - like a tightrope walker without a safety net - desperately balancing costs with resources it simply doesn't have.

Underpaid healthcare workers leave in droves, worsening staff shortages - leaving around 7% of NHS jobs unfilled. Brexit has only worsened the impact: migrant workers who previously filled roles are now unable to even enter the country. The UK exemplifies what happens when a country fails to balance costs, resources, and manpower. These three pillars are interdependent: if one collapses, the entire system is at risk.

Yet, all is not lost. The UK's crumbling healthcare can be rebuilt; this fallen temple to medicine is still salvageable. The key issue with UK healthcare is the conventions of treatment.

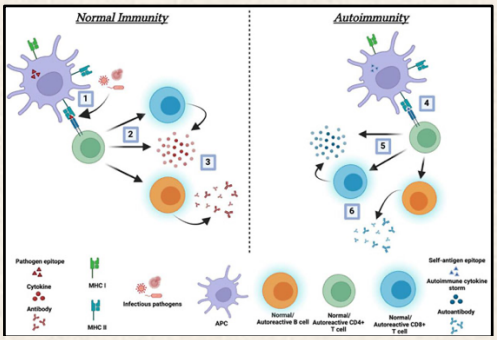
Conventionally, the UK follows the model of a 1st world country, with hubs of healthcare, such as large hospitals, focused on providing high-quality care to dense population hubs. However, the NHS struggles to deal with the underlying issues leading to such a strain on hospitals. As a rule, higher-income countries focus too much on providing healthcare to the 1% who require a specific treatment, and neglect the 99%, who could easily be treated with more funding into generic services, such as increased numbers of GPs and better access to the essential information. The UK's healthcare system may seem broken, but with more focus on prevention and addressing the root causes of health issues, it can still be recovered.

Maybe the future of healthcare isn't in building bigger hospitals, but in creating smarter, more resilient, community-based solutions. Maybe if we truly want change, we must challenge the conventions that brought us here.

Autoimmune Diseases: An Unconventional Immune System

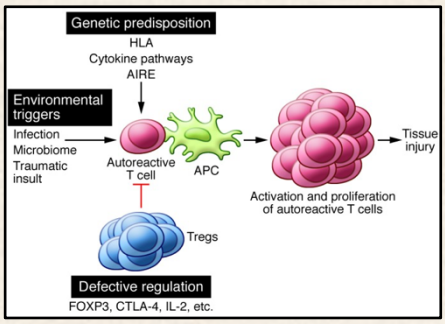
Rebecca Peet

Autoimmunity is an abnormality, where the body's own autoantigens are recognised (proteins produced by the body) as harmful, causing a series of molecular and cellular events, including the destruction of its own tissue. There is no one cause, with genetics, drugs and infection all increasing the risk of it being triggered.



Genetic predisposition cannot singularly initiate autoimmunity, however, it can increase the risk that it will be set off. This is thought to result from polymorphisms, two or more possible variations of genes involved in immune function. One set of the genes affected are those that are associated with T-receptor cells; protein complexes found on the surface of white blood cells known as a T-cell, which bind to specific proteins on the surface of antigens. Binding to these antigens allows the body to recognise the non-self cells, activating white blood cells, triggering an immune response. In an attempt to further protect the body, T-receptor cells are highly variable, enabling them to recognise the multiple types of cells that the body needs to protect itself from. However, the large number of variations can lead to the development of white blood cells that are easier to activate. This increases the risk that a self-reactive T-cell will be activated, becoming capable of autoreactivity and reacting against the body's own cell/tissue.

Another set of genes affected are those associated with the chemicals that cause white blood cells to differentiate, enabling them to kill the non-self-cells that have been recognised, these are called cytokines. For example, there is a type of cytokine that increases the tendency to cause inflammation in a specific type of white blood cell. If the body produces too much of this cytokine, it can lead to excess inflammation, linking to autoimmune diseases such as Crohn's, Behcet's, psoriasis and more which all have inflammatory aspects. There has also been increasing evidence linking the X chromosome with the development of autoimmune diseases. The X chromosome contains the largest number of immune-related genes of the human genome and therefore, could possibly explain the reason women are more prone to autoimmune diseases (as women have two X chromosomes, men an X and Y chromosome). However, this is still uncertain.

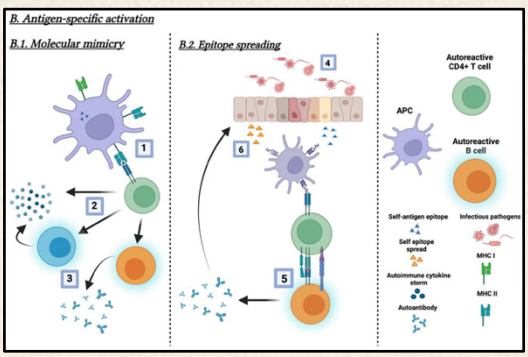


Medications are yet another factor which have been shown to play a role in the development of autoimmune disease. When continuously exposed to a drug, an autoimmune reaction can occur - 'drug induced autoimmunity' -, yet after stopping use of the drug, the problem can resolve itself. This is classed as a "Type B" drug reaction, meaning that the reaction cannot be predicted based on known pharmacological actions of the drug, and it is more patient specific. The most common example of this is drug induced lupus, the usual culprit being minocycline, a drug used to treat several bacterial infections.

The beginning of symptoms are a result of autoantibodies being produced, a type of protein which reacts against antigens on self cells. This can occur by multiple different ways, one of which being the 'suppression of central or peripheral tolerance'. Central and peripheral tolerance is how self-reactive cells are eliminated, and if this is suppressed more and more self-reactive cells will

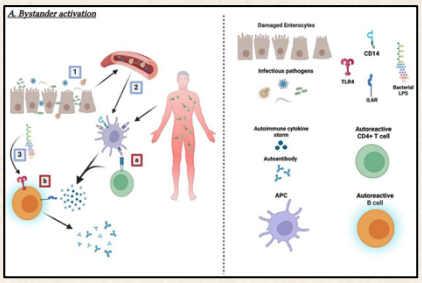
be present in the body, and the risk of autoimmunity rapidly rises. Another mechanism which the suppression can occur by is through the alteration of gene transcription in T and B cells (white blood cells). Gene transcription is how the mRNA that codes for the amino acids which will eventually become the T and B cells is made. Proteins are made of up a specific sequence of amino acids, and to know what order they go in, mRNA essentially provides an instruction manual. Altering the mRNA changes the amino acids which form the T and B cells, leading to a possible change in the structure of them, reducing their ability to carry out their purpose. On the other hand, suppression can also be caused through atypical cytokine and/or cytokine receptor function. Cytokines are what stimulate white blood cells to begin attacking disease causing pathogens, so if their function is impeded, for example by activating the wrong type of white blood cell, this can lead to problems in the immune system and therefore lead to autoimmunity. Overall, the process in which drug induced autoimmunity occurs changes depending on the drug that causes it, but knowing how the drug works to cure what it is prescribed for, can help to understand how it is also inducing autoimmunity.

Shortly after suffering from an infection, autoimmune diseases can sometimes occur, as microorganisms can set off changes making the immune system attack itself, known as 'infection mediated autoimmunity'. There are numerous mechanisms involved in infection mediated autoimmunity, including something called molecular mimicry. This is when an antigen shares a similar DNA sequence or structure to the proteins on the surface of the body's cells that ensures they don't get attacked by the immune system; these proteins are called self-antigens. Due to the self-antigens being similar to those of the pathogen, it causes the white blood



cells fighting off the pathogen to get confused between the self-cells and the harmful ones as their antigens are so similar. This results in the attack and destruction of the body's own cells, leading to autoimmunity.

Another way autoimmunity is triggered is through bystander activation - the activation of white blood cells without the recognition of an antigen. When an immune response occurs, chemicals called cytokines that activate the white blood cells to start attacking the pathogens are released. However, nearby self-reactive white blood cells can undergo what is known as bystander activation and are also activated, causing an autoimmune response as they begin to attack the body's own cells. A different method is epitope spreading. When self-antigens are released during infection to help the body to distinguish between its own cells and the pathogen, the parts called epitopes that enable the immune system to recognise them are sometimes left when the infection is over. This causes the body to react to the epitopes as it thinks they came from the pathogen, resulting in the activation of the self-reactive cells, causing autoimmunity. Bacterial, viral, fungal and parasitic infections can all lead to infection mediated autoimmune disease, however the methods in which this happens are not all known.



Autoimmune diseases have a variety of causes, each specific to the type of disease, making it difficult to pinpoint the general cause of them, as they vary vastly. Whilst they don't solely cause them, genetics have been shown to play a key role in the likelihood of an autoimmune developing, meaning in spite of other factors, some people are already predisposed. This complex issue is still not fully understood, however hopefully current and future research will help us decipher this complicated concern. With an autoimmune disease, the immune system does not follow a conventional way of working, resulting in various possible outcomes in the form of autoimmune diseases.

ECONOMICS

"Economics isn't just about stock markets or government budgets—it's the study of how people, businesses, and nations make choices when resources are limited. It helps us understand why prices rise, why jobs are created or lost, and how policies affect everyday life. Whether you're deciding how to spend your paycheck or a country is planning its energy strategy, economics is the lens that reveals the hidden forces shaping those decisions."

Traditionally, economics have shaped the global landscape, where the foundations of the world's economy conflict, leading to conventions unseen by many but affecting all. Day to day activities, historic ideologies and cultural frameworks collide in ways that expand outside of typical perspectives in intricate ways that shape our present and future. Habitual consumption and its deep-rooted influences have shaped our frame of mind into accepting negative behaviour as a collective, restricting those who persist and challenge these 'norms'. We have set out these conventions and woven them into the fabric of society, hindering true progress, depending on a fragile supply chain, highlighting the vulnerability of trade and the crises that ripple across the world as a result. Our section aims to illuminate the issues within society that prevent this advancement into the future, exploring these complexities and inviting you to understand how critical it is to move towards a more inclusive and resilient economy.

-Luke Mackey, Lower Sixth
Section Editor

Sustainability vs. Consumption Habits

Julian Hoppe

Are our consumption habits and advertising strategies in contradiction to sustainability? With this question in mind, this article discusses two examples that illustrate which consumer habits and advertising strategies jeopardise the environment.

Christmas is the festival of love, peace and family. But it can also be seen as a festival of consumption and waste. For many years, the Christmas period has been seen as the peak of consumption and for many companies, this is the time of year with the highest turnover. However, it's not just about the consumption itself, but also the waste associated with it. In the UK, around £42 million of gifts are thrown away every year. In addition, around 227,000 miles of wrapping paper are used and thrown away every year. If you look at the figures for food waste and electricity consumption over the Christmas period, these figures are similarly staggering.

But of course, it's not just consumers who contribute to environmental pollution. Manufacturers and online shops also contribute significantly. Around 82% of adults who celebrate Christmas think that companies use too much packaging material that cannot be recycled. In addition, two-thirds of respondents would like companies to be transparent about the environmental impact of Christmas shopping. This was the result of a study conducted by CIM in 2021.
Is it possible to combine our consumer habits at Christmas with sustainable behaviour? The 'Green Christmas' trend, which emerged due to the increasing burden on the environment, is one possible way forward. Many people are now consciously deciding to make their Christmas season more sustainable. This is possible, for example, by reusing Christmas decorations and wrapping paper. It also makes sense to buy presents, decorations and food from local shops. Many people also think about what and how much they are going to give away. They are trying to break the habit of giving new clothes, electronic devices and toys. This is because electronic waste and the disposal of clothes that are still wearable place a particularly heavy burden on the environment.

The CIM study from 2021 shows that around three-quarters of respondents would like to change their behaviour to celebrate Christmas in a more environmentally friendly way. These findings therefore show that it is definitely not necessary to give up Christmas completely in order to look after the environment. Even small changes in our behaviour can often help to create a more sustainable world. Before the next festive season, you may ask yourself whether you can buy things in your neighbourhood, whether you can reuse wrapping paper and whether you have any ideas for sustainable gifts.
In addition to consumption at Christmas time, the fast fashion trend also plays an important role when it comes to sustainable consumption. Fashion trends sometimes change very quickly: skinny jeans have been replaced by wide trousers. Meanwhile, trainers, which were popular 20 years ago, are back in fashion. Every year there are new

trendy colours for the summer. The fashion industry's advertising strategies in particular give consumers the feeling that they need new clothes to follow the trend. That's why we're all happy when we can buy cheap clothes in spring so that we're in line with the latest fashion trends. However, this consumption of cheaply produced clothing is unfortunately extremely harmful to our environment.

The following facts show just how harmful fast fashion really is: according to an analysis, the fashion industry causes 10% of global carbon emissions. The industry pollutes rivers and renders water sources unusable. Even when washing clothes, 500,000 tonnes of microfibers are discharged into the sea every year. Meanwhile, 85% of all textiles are disposed of every year because the produced clothes cannot be sold or clothes that are barely worn are quickly discarded.

Major players in this industry include Zara, H&M, Forever 21 and Shein. They focus their production on making clothes as quickly and cheaply as possible. In some cases, garments are designed, produced and delivered to the shop in just two weeks.
But how can we, the consumers, prevent this dangerous trend? We often find ourselves wanting new T-shirts, jackets or sportswear without having to spend a lot of money.
There are several ways to do this: firstly, we should visit second-hand shops more often when we are looking for new items for our wardrobe. Similarly, we should not simply dispose of our clothes but ask second-hand shops if they can sell them.
In this way, we support the reuse of clothing and could buy clothes at better prices.

On the other hand, we should make sure that we buy durable and basic clothes that can be combined in several outfits. And it is also always advisable to question whether the latest trend really suits you or whether it is not better to continue wearing the clothes you still like.

The best advice for reducing the environmental impact of fast fashion comes from a fashion marketing lecturer at the University of Manchester, who says: 'Less is always more'.

Overall, these two examples show that we live in a consumer society and that people have extreme consumer habits. They like to buy new things, they love to give and receive gifts and they are influenced by good advertising strategies. Some of the facts and figures listed show just how much of a threat this poses to the environment. But these examples also show that there are uncomplicated ways in which habits can be broken. The more often we think about the impact of our consumption, the easier it may be to change our existing habits into sustainable behaviour.

Collapsing Conventions: Women in Economics

Luke Mackey

For many years, women were excluded from most academic studies, including those involving economics. Now, the structure of economics has drastically changed, and the involvement of women has led to brilliant contributions, changing the economic state of the world. This unprecedented progress of women is a testament to the hard work of many female economic pioneers, fighting for their places and defying societal norms.
Traditionally in the past, the field of economics was dominated by men, as women were confined to family-oriented responsibilities and pushed away from the sector. Education was not available to the majority of women across Europe until the late 19th/early 20th centuries, creating a nearly impossible pathway into the labour force outside of the domestic sphere. Despite being able to be part of this field, women were often denied any major roles of responsibility with leadership opportunities or recognition, meaning they needed to engineer their own ways to prove that gender had no effect on their capabilities.

In the early 21st century, women began to break through in much greater numbers, making huge strides towards independence, in not only academic study but also global development. Key figures such as Elinor Ostrom, who won the Nobel Prize in Economic Science in 2009, reshaped the perspective of economic ideas. Ostrom brought attention to the minor subject of collaborative economics with work on how communities manage resources. Ostrom focused on how communities can do this without relying solely on government intervention or privatisation, highlighting that they often develop sophisticated systems of self-governance that are more sustainable and effective than top-down or market-based solutions. Today, women are thriving in education and are also in key roles that help mould policies.
The role of women today goes beyond academic research, with them now being integral to addressing issues such as inequality and poverty, whilst also advancing global development. The rise of women has allowed economists to develop new views on how economies should function, with their approach ensuring that the needs of many marginalised communities are better understood. Feminist economics has played an important role in questioning the assumptions that form more mainstream economics. They focus on how gender may affect economic outcomes and challenge stereotypical models that had previously dominated economics, contributing to the understanding of environmental and health economics, and pushing for a more inclusive approach that values society's well-being over maximising profits.

Famous Economists:

1. Elinor Ostrom – a figure in the study of collective action, as previously mentioned Ostrom won the Nobel Prize in Economic Sciences in 2009. Her research has made a lasting impact on modern ideas about governing and resource management.
2. Christina Romer – Romer is known for her contributions to macroeconomic research on the causes and consequences of the Great Depression. She served as the Chair of the Council of Economic Advisers under Obama, playing a key role in the shaping of

American Recovery and the Reinvestment Act.

3. Martha Nussbaum - Nussbaum co-developed the capabilities approach with Amartya Sen. Her work focuses on the intersection of ethics, human development, and economics, and she has emphasized the importance of social justice in economic policies. She explores how capabilities can help measure well-being and design policies for social justice.

4. Claudia Goldin – Goldin was a scholar of labour economics and also the economics of gender. Her research focused on the history of women in the labour force, gender wage gaps and the advancing roles of women in the workforce. She explored the barriers women had to overcome and how the gender pay gap has changed.

5. Rachel Reeves – Reeves was recently appointed the first ever female Chancellor of the Exchequer following Keir Starmer's election victory, now being a prominent figure in the UK economy. She has promoted growth and social justice, with her experience allowing her to tackle the UK's economic challenges.

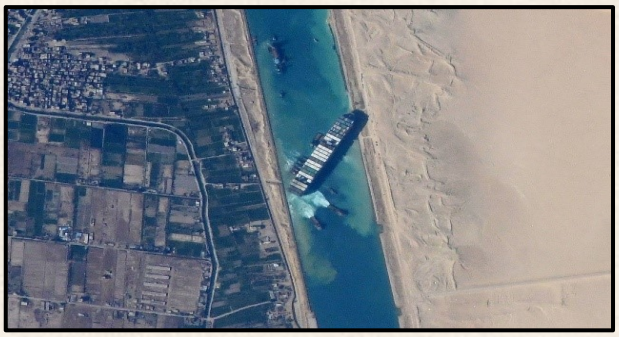
While there has been significant progress, there is still a lack of representation for women in economics. An increase in the participation of women in the field means that societal bias that discourages women from following economics needs to be addressed. However, the progress already made shows promise and hopes to inspire future generations. The work of women continues to challenge outdated economic models, bringing new perspectives and ways of thinking about the economies of the world. The more inclusive the field becomes, the easier it will be to figure out solutions to global challenges more effectively. Gender laws affect the global population as a whole as well as the 'western world' with over 2.7bn women being legally restricted from having the same variety of jobs as men, along with laws restraining them from working. This prejudice is not just for participation, but also continues across to areas such as workplace harassment, with 43 economies having no laws on sexual harassment in the workplace.

In conclusion, the roles of women have exceeded previous expectations, playing vital roles in workplaces across the globe, battling and collapsing conventions that had restricted them in the past. This outlines an era of inclusion, progression and triumph for women throughout the global economy.

The Suez Canal Blockage: Implications for Global Trade and International Maritime Conventions

Fin Robertson

The Suez Canal is a vitally important maritime canal linking the Mediterranean and Red Sea together, handling an estimated 19,000 ships per year and providing an incredibly efficient means of global trade (accounting for around 12% of all global trade), specifically between Asia and the Middle Eastern/European nations. However, for 6 days in March 2021, a 400m long container ship named the 'Ever Given' was knocked off course by incredibly strong winds, lodging itself in the canal and blocking it. This incident disrupted global supply chains, highlighted limitations of international trade and raised concerns about the maritime regulations in place at the time.



Over 400 ships, transporting goods such as crude oil, natural gas, consumer designed products and raw materials, were stranded, unable to pass through either end of the Suez Canal, implicating a delay in the delivery of these goods worldwide. Some of the affected ships opted to reroute and travel an alternative route around the 'Cape of Good Hope' off of the coast of South Africa, meaning 10 days more travel, combined with the extra costs of fuel consumption. The supply issues were prolonged after the canal was liberated, due to the sudden influx of ships arriving in ports. They were all overwhelmed, further delaying production, manufacturing and sales of businesses, leading to large economic losses. Some businesses even completely halted production, a key example of this was VW: across some of its main European plants, they didn't have the parts required to make their models.

Overall, the blockage stopped around $9.6 billion in global trade per day, totalling around $60 billion in total. The blockage also resulted in rapidly rising freight costs, as the demand for goods remained the same, but the supply vastly decreased, freight rates spiked by roughly 400% on average, increasing costs of production for firms and also increasing the amount that governments would have to spend on imports across the world. Furthermore, not only the costs of freight rose, but the price of other crucial commodities like oil rose too. An estimated 10% of global oil shipments pass through the Suez Canal, so the blockage then caused a rise in oil prices by nearly 5% worldwide.

The blockage raised significant legal and regulatory concerns, highlighting areas where maritime conventions would require reinforcement, or the introduction of new regulations.
It led to many complex legal disputes involving many of the affected supply companies, along with the owner of the Ever Given (Shoei Kisen Kaisha) and the operating company (Evergreen Marine). The main legal issues were:
The SCA (Suez Canal Authority, an Egyptian state-owned authority which owns, operates and maintains the Suez Canal) demanded $916 million in compensation for damages

and lost revenue. This case highlighted the gap in the law for liability in case of accidental blockages in major waterways.

The Limitation of Liability for Maritime Claims (LLMC) – Shoei Kisen Kaisha (Ship owner) attempted to invoke this law to cap its liability cost at $114 million instead of the originally proposed $916 million. They argued that they could apply this law due to the blockage being caused by external factors that they weren't able to control, therefore removing their culpability. This led to legal disputes across Egyptian courts over whether liability limits would be applicable in an incident that had been so economically detrimental across the globe. The SCA argues that the economic damages were too significant for the laws to be applied, thus highlighting the need for a re-written set of rules for the LLMC in the event of future occurrences.

– A slightly more effective maritime regulation was the general average law. A principle that required all corporations that had cargo on the Ever Giver had to pay equal amounts into the costs of compensation and reparation of the blockage. Examples of companies that filed claims with their own cargo insurers to recover financial losses were Nike and Ikea, who had both had cargo on the blockading ship.

The 'Ever Given' case was one of the most financially complex maritime insurance claims, testing many of the limited maritime conventions in place at the time. The final settlement altered the way in which the shipping industry approaches liability in global trade disruptions. Although there have been no new conventions put in place since the blockage, the SCA has put into place new measures to ensure an event like this doesn't occur again these include; The Suez Canal being widened by 40m to improve navigability, increased tugboat support and escort requirements for larger vessels travelling along the canal and navigation of the Suez Canal requires more experienced pilots, combined with traffic monitoring of the shipping lanes to ensure there are no repeats of the 2021 incident.

In conclusion, the advancements of globalisation may be partially responsible for this incident, as an increase in the global demand for products has put a significant amount of pressure upon the canal as a trade route. As a result of this the canal may have been overwhelmed by this influx of cargo shipments, leading to the blockage, reducing the availability of trade through this circuit. In future, other methods of trade may be effective to tackle the burden placed on the Suez Canal.

PSYCHOLOGY

"Who looks outside, dreams, who looks inside, awakes" – Carl Jung

Psychology is the scientific study of the mind and behaviour, allowing us to understand our mental processes and motivations. It can be used to explain almost everything that occurs within humans and is at the foundation of our lives. In psychology, convention refers to a commonly accepted and agreed-upon standard or practice in a given society or culture. It includes social norms and dictates how individuals are expected to behave or interact in various situations. In this section, we have looked at what happens when behaviour falls outside the scope of accepted norms and how this deviation may lead to criminality or the uprising of dictator. We have explored the change in psychological norms over time, and the struggle of certain mental illnesses. We have also looked into the impact of incarceration on mental health and how a forced change in circumstance can lead to a digression of our normal psychological responses.

Jaya Bright-Thomas, Lower Sixth
Section Editor

The Struggle of Invisible Illness

Emma Broomhead

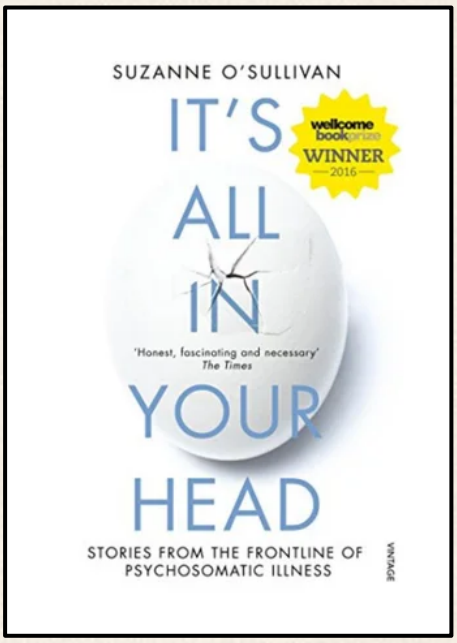
Psychosomatic or functional disorders originally evolved from the concept of hysteria, which was first classified as a mental disorder in the 1880s by Jean-Martin Charcot and was mainly attributed to women who were deemed unable to control their emotions. Due to hysteria being perceived as a social construct to undermine women instead of a respected diagnosis, it has slowly lost respectability? modern medicine. Psychosomatic and functional disorders only differ from hysteria in the way that they can be applied both to women and men equally but are unfortunately still widely misunderstood due to these past misconceptions.

The scientific definition of this disorder is a 'condition in which physical symptoms are caused by mental stress', however, I don't believe this gives enough credit to how debilitating psychosomatic disorders can be. They mostly occur when a traumatic event has been suppressed to the extent that the body begins to suffer by any means physically possible (from seizures to paralysis and everything in between). Psychosomatic symptoms are far more common than the disorder and are something you will have experienced in your everyday life, for example sweating when you are anxious or crying when you are sad. These are all physical symptoms caused by an emotion or feeling; psychosomatic disorders cause much more violent symptoms like loss of feeling in limbs or even blindness.

However, emotions are abstract concepts, which makes diagnosing a psychosomatic disorder near impossible for a medical professional, as instead of being able to test for it directly they must rule out all other physical disorders before it can even be considered. To demonstrate: a patient could be having seizures and before a diagnosis of functional seizures can be made, the doctor must rule out all other possible causes for a seizure. This often includes running and rerunning many tests, which is expensive and time-consuming, and therefore both damaging for the patient and straining the health provider. This sheer extent of medical examination is often incredibly traumatic for the patient, and then to be diagnosed with a mental disorder can be extremely hard to swallow, especially when you are demonstrating only physical symptoms. To add to this, on occasion a treatment for the psychical ailment can cause this disorder to seemingly disappear for a short period of time, as the brain has been fooled into thinking the issue has been solved. However, this never lasts forever as the mental trauma remains unresolved, meaning the symptoms will often resurface in other ways until therapy is used to deconstruct this trauma. Unfortunately, this only adds to the length and confusion of the disorder.

I recently finished reading the fascinating book 'It's all in Your Head' by Suzanne O'Sullivan, in which O'Sullivan (as a neurologist) talks about her patients who have had psychosomatic disorders and their struggle to believe their diagnosis. The past label of psychosomatic disorders as hysteria has generated a lot of controversy and negative connotations around the disorder, making it a struggle for O'Sullivan to encourage her patients to trust their diagnosis. She goes into detail in the book about how she has learnt from past mistakes of telling her patients their diagnosis when they are clearly not ready to hear or accept it, resulting in them almost always believing she thinks they are mad or insane (which is never the case). O'Sullivan stresses the importance of knowing how impactful a psychosomatic disorder is, as in all cases the physical symptoms the patients feel

are horrific, and while they may be the result of a mental condition, they are still very real and very debilitating for the patient. I believe it is essential that doctors believe their patients are truly ill because, in the patients' eyes, any amount of doubt from the doctor is invalidating their very real struggle. In my opinion we could all benefit from reading this book as it carefully deconstructs any misinformation surrounding psychosomatic disorders, and highlights the real and worryingly common struggle of people suffering with this disorder.



Unfortunately, one of the things that taints the image of psychosomatic disorders is Munchausen syndrome, in which a person fakes an illness or makes themselves purposefully unwell. These very rare cases seem to affect medical professionals' views of all of their patients and often can cause someone with a functional disorder to be treated as suspicious or prioritised less. This is flawed in many ways as psychosomatic disorders are far more common than Munchausen syndrome and so should be treated as such. Moreover, I also believe this suspicion is flawed; in the rare case that a patient is struggling with Munchausen syndrome, it is because they have a severe and often damaging mental illness that needs to be treated properly and with the same respect as any other mental or physical disorder, not frowned upon or discredited.

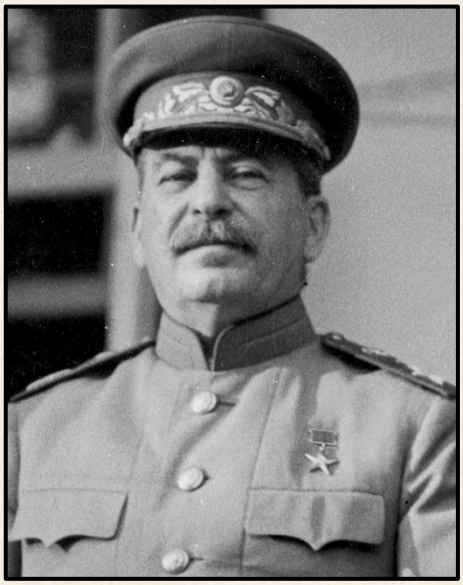
I believe it is crucial that anyone in the medical field is aware of psychosomatic disorders and is therefore qualified and informed to treat them with the respect that they deserve, in an effort to hopefully reduce the stigma surrounding them. Then, maybe, as a society, we can begin to help more people accept their diagnosis, in order to begin to heal in therapy.

The Psychology of Dictators

Sophia Lipniski

Dictators often exhibit a complex psychology characterised by traits such as narcissism, paranoia, and a powerful desire for control. They typically possess an inflated sense of self-importance, viewing themselves as indispensable to their nation and even considering themselves parallel to Gods. This narcissism drives them to seek admiration and loyalty, while their paranoia leads to oppressive measures against perceived threats, both internal and external.

As a child, Josef Stalin suffered from a negative image and an inferiority complex. Stalin grew up with a challenging childhood, facing the struggles of poverty and enduring beatings from his father at home, while physically suffering from his smallpox scarring and a deformed left arm. Stalin's dysfunctional family instilled bitterness into him, potentially developing his violent tendencies that were exhibited throughout his time in the Bolsheviks party. As Stalin rose through the ranks, he became merciless, ordering the execution of the former Tsar's officers and counter-revolutionaries during the Russian civil war. This began his ruthless reputation that even predecessor Lenin was wary of. After Lenin passed away in 1924 Stalin wanted to appear as Lenin's prodigy, convincing the people that he was a loyal follower of Leninism by depicting himself alongside the spirit of Lenin in propaganda posters. Throughout Stalin's rule he began conditioning the people to believe he was God, depicting himself as omniscient and omnipotent. The dictator's image was everywhere: there were icons of him in homes, and parades included banners of his face. This obsession caused a cult of personality to become associated with Stalin, who equated the survival of his regime with the survival of his country; meaning only he could guarantee the survival of the state.



Despite Stalin presenting himself as the saviour of the Soviet Union, his paranoia plagued him. Stalin was troubled by delusions of conspiracy; instead of seeing dedicated Russian generals he saw traitors and foreign collaborators. In 1937 Stalin believed that leaders of the Red Army were conspiring with Germany. They were falsely accused but still found guilty and were executed. It is estimated that approximately 30,000 members of the red army were executed in total. Similarly, in 1953 Stalin believed that medical specialists were conspiring to murder government officials, resulting in their arrests. This incident became known as the 'Doctors' plot', and it exemplified Stalin's paranoia and growing conspiracies. Stalin's neurotic traits were examined as early as 1927 when the Russian psychologist Vladimir Bekhterev diagnosed him as a paranoiac. After this diagnosis was made Vladimir Bekhterevmysteriously died within 24 hours, but it was conspired that he was poisoned by the order of Stalin.

To conclude, it is assumed that Stalin suffered from narcissism with elements of sadism and paranoid tendencies. These disorders can be used to develop an understanding of why Stalin acted the way he did and why he so

willingly ruined many lives without feeling remorse.

Many dictators are adept at using crises to strengthen their images as national heroes. These methods are used by many dictators including Adolf Hitler, who blamed the Reichstag fire in 1933 on communists, and therefore Hitler provided scapegoats for the people, Benito Mussolini and Vladimir Putin. These dictators provided answers during a time full of questions. They presented themselves as the heroes of their nation.

Vladimir Putin's tough childhood shaped his character and his mind. He grew up in a communal apartment filled with vermin, his mother struggled to provide for the family, and his father had sustained injuries during the second world war. Putin was forced to fend for himself as he was severely bullied by other children, resulting in him being involved in many fist fights. Aged 22, Putin was asked to join the KGB, which was the main security agency of the Soviet Union where he learned how to use information to his personal advantage. Similarly to Stalin, Putin is believed to have paranoia due to having a strong desire for power and control; over the years Putin has eliminated opposition and those with power. He talks about the constant enemies surrounding his country, and the controversial belief that the war in Ukraine is an act of defensive survival. He has the desire to establish dominance over others: during a meeting with Angela Merkel, the previous chancellor of Germany, Putin allowed a large dog to roam around the meeting despite Merkel's well-known fear of the animal.

Putin is also assumed to be sadistic due to his need to humiliate and demean people in the presence of others. He operates through intimidation to force others to comply. Alexei Navalny was the face of Russian opposition to Vladimir Putin but in 2020 he was severely poisoned with a Novichok nerve agent. He accused President Vladimir Putin of being responsible for his poisoning, and when he returned to Russia in 2021 he was immediately detained on accusations of violating parole conditions. Navalny was constantly being sentenced to more years in prison until in 2024 the Russian prison, Polar Wolf Colony, one of the strictest prisons in Russia, reported that he had died. Many believe Putin is responsible for the death of Navalny, demonstrating Putin's desperation to remove all opposition. Finally, Putin attracts followers through reviving the Soviet Union,shown through the invasion of Georgia in 2008, the annexation of Crimea in 2014 and the full scale invasion of Ukraine in 2022.

In conclusion, the psychological profiles of dictators such as Stalin and Putin reveal significant links to conventions of power and control. Both leaders built their country through a foundation of fear, propaganda and a strong sense of nationalism. They created barriers and divisions by imposing their ideologies on society which manipulated the social norms of society to justify the brutal repression.

The Psychological Impacts of Incarceration

Jaya Bright-Thomas

Custodial sentencing for offenders of a serious crime is viewed as an accepted punishment by society and aims to incapacitate individuals who pose a threat of harm to others, forcing them to show retribution for their actions and deter them from reoffence. However, there is an ongoing debate as to whether incarceration in prison can have an adverse negative impact on an individual's mental state. In some cases, through the use of rehabilitation methods such as Cognitive Behavioural Therapy (CBT), educational programmes and drug and alcohol treatment programmes, offenders can alter their thoughts and perceptions, resulting in an improved mental state upon release. However, many individuals experience a significant decline in their mental health, such as an increase in anxiety, depression, and other psychological disorders during and after incarceration. The stress of being in a confined space, the lack of meaningful tasks, isolation from loved ones, and uncertainty about the future can lead to severe psychological strain.

A method that has been proved to be highly effective when it comes to improving mental health is Cognitive Behavioural Therapy (CBT). This programme aims to develop cognitive skills and restructure biased and distorted thinking. It is based on the idea that our thoughts, feelings and behaviours are interconnected. CBT helps offenders to change the way they think by challenging unhelpful thoughts and patterns of behaviour and replacing them with healthier habits. In a prison environment, CBT encourages inmates to take responsibility for their actions and refocus on future possibilities rather than past mistakes. CBT helps with anger management, substance misuse treatment and mental health issues by equipping prisoners with strategies to control and cope with their emotions, facilitating their ability to function in prison settings and post-prison. Research conducted by academics at the University of Bristol, along with colleagues from the Universities of Exeter, Oxford, Glasgow, and University College London can be used as evidence for the high success rates of CBT. They found that over the course of 46 months, 43% of those who had received CBT had improved their psychological state, reporting at least a 50% reduction in symptoms of depression.This method successfully changes a prisoner's thought process, prompting them to make more positive decisions, and thereby improving their mental state.

Another conventional method used in prisons is the implementation of educational programmes. These provide prisoners with the skills, knowledge and resources needed to achieve and maintain the lifestyle of a law-abiding citizen, preventing re-offence. These programmes can be educational or teach participants how to keep jobs, learn to budget and develop constructive relationships within society. Ultimately, these skills provide participants with the tools they need to successfully transition back into society after release. Also, education fosters self-confidence and offers mental health advantages by providing a sense of purpose and achievement, potentially even increasing the number of job opportunities in the future. This is evidenced in The Coates Review, published in 2016 by Sally Coates, which highlighted the need for prison education to be at the heart of the prison system due to the positive impact it has on those suffering from poor mental health.

Finally, drug and alcohol rehabilitation programmes have been proven to be a successful approach to reduce mental health problems. These support offenders with substance abuse disorders, helping them to make positive changes in their life. It also offers participants the chance to be part of a community and conform to social conventions. These social interactions can prove vital for a person's mental health, helping them to build supportive relationships which in turn improves their mental state.

Overall, these rehabilitation methods offered by prison can be significant in enhancing a participant's mental well-being. However, there are often limited opportunities and funding constraints for the programmes, and therefore, many prisoners do not get to experience the benefits that they offer.

Conversely, prisons can have a profoundly negative impact on a person's mental health, causing a major increase in anxiety, depression and much more. The disturbingly high numbers of individuals with mental health disorders locked up in prisons is often talked about, yet less attention is paid to the ways in which incarceration itself perpetuates this problem by creating and exacerbating symptoms of mental illness. The often hostile environment can be inherently damaging to mental health by isolating people from society and eliminating meaning and purpose from their lives. Moreover, the appalling conditions common in prisons and jails – such as overcrowding, solitary confinement, separation from support networks and frequent exposure to violence – further deteriorate mental health. Researchers have even suggested that prison can lead to "Post-Incarceration Syndrome," meaning that even after serving their official sentences, many people continue to feel mentally imprisoned. Incarcerated people have virtually no control over their day-to-day lives, including when they wake up, what they eat, what their jobs are, and when they have access to recreation. This can lead to feelings of dependence and helplessness.

A 2018 study conducted by researchers at the University of Georgia examined the relationship between prison conditions and mental health in 214 state prisons, revealing that people incarcerated more than 50 miles from home were more likely to experience depression. Psychologists have also stated that people with strong social support and positive family relationships tend to have better psychological wellbeing. Overcrowding often means more time in cells, less privacy, less access to mental and physical healthcare, and fewer opportunities to participate in programming and work assignments. A 2005 study found that overcrowding is highly correlated with prison suicide, while a further study showed that overcrowding can be linked with hostility and depression among inmates.

Solitary confinement in prisons is a conventional way to maintain institutional order and reduce victimization by removing certain individuals from the general prison population for their own safety or for the safety of others. However, the psychological toll of solitary confinement can lead to permanent changes to people's cognitive processes and behaviours. Depriving human beings, who are naturally social creatures, of interaction can cause 'social pain,' which activates the same areas of the brain as physical pain. When someone is incarcerated, they are no longer known for their profession

and previous social reputation or for their skills, talents, and knowledge. The loss of a sense of self can be quite disorienting, confusing, and troublesome. Feelings of anxiety and depression can also be exacerbated by the unpredictable nature of the prison environment. All these aspects of a prison environment makes retaining a positive mental wellbeing very difficult for prisoners and can cause long-term damaging effects to their mental health.

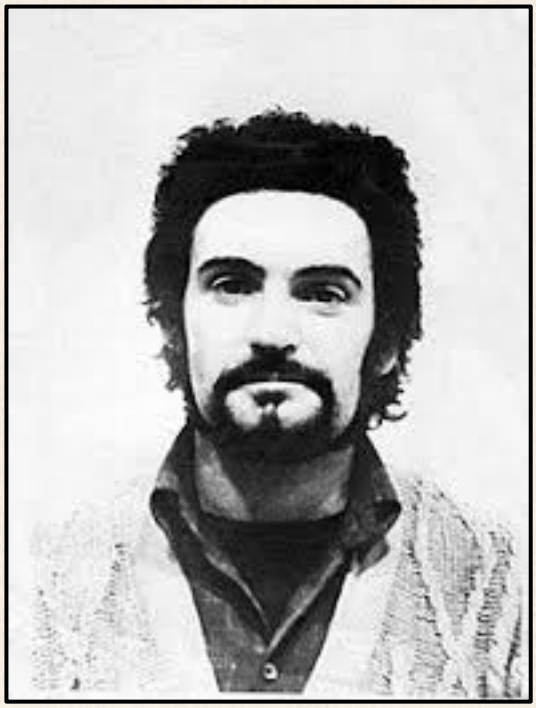
To conclude, criminal justice system convention stipulates that offenders of a serious crime should be imprisoned and whilst incarcerated receive rehabilitation to change offender behaviours. Whilst prisons do offer rehabilitation programs that have the potential to improve mental health, these resources remain relatively limited and difficult to access. Consequently, many prisoners experience a deterioration to their mental health when incarcerated due to the harsh conditions associated with prison life. By its very nature, incarceration fosters isolation, uncertainty and causes extreme stress, all of which contribute to long-term mental health deterioration. This could be solved through increasing funding into rehabilitation methods (such as CBT) into prison systems, allowing prisoners to have greater opportunities to maintain and improve their mental well-being.

Peter Sutcliffe: The Rights of Mentally Ill Individuals and the Ethical Conventions Surrounding Them

Lily Courtney

Many crimes have been committed by mentally ill people, raising critical questions regarding mental illness in criminal law and ethical rights in psychiatric assessments.

The case of Peter Sutcliffe, also known as the 'Yorkshire Ripper', remains one of the most infamous in British criminal history, not only because of the brutal crimes he committed, but also the ethical and legal debates that it prompted surrounding his mental health.



Peter Sutcliffe was an English serial killer who was found guilty of murdering thirteen women and attempting to murder seven others between 1975 and 1980. Starting at the age of 29, Sutcliffe often attacked his victims with blunt instruments like a hammer or heavy tool before stabbing them with a knife. The victims were usually attacked in isolated areas and were abandoned in remote places. Sutcliffe would strike them in the head and body, and sometimes carry on beating and terrorising their bodies even when dead. Arrested in 1981, Peter pleaded not guilty, stating that auditory hallucinations commanded him to kill, as he claimed to be on a ''Mission from God'' to rid the world of prostitutes, saying he "cleaned up filth". He also spoke about hearing a voice from within a stone at the religious site of 'Shirdi Sai Baba Temple' in India, which further reinforced that he was acting under 'Divine guidance'. Despite Peter's claims of these hallucinations many experts disputed his claims, and some suggested his behaviour was mainly driven by a mix of anger, misogyny and desire for domination. Even though psychiatric evaluations diagnosed him with paranoid schizophrenia, he was convicted of murder and sentenced to a life in prison.

However, in 1984 he was then transferred to Broad-moor psychiatric hospital, where he remained until being sent back to prison in 2016. Our legal system generally operates on the idea that individuals should be held accountable for their actions, unless they lack the mental capacity to understand their wrongs, and that mentally ill individuals should receive treatment rather than punishment. For Peter though, the court initially rejected the diagnosis before realising his vital need for care.

Peter's prolonged lack of care and treatment for those 3 years before being transferred to Broad-moor hospital raised concerns regarding the protection of his rights, or if he even deserved any rights after the crimes he committed. Headlines and news reports focused on the brutal nature of his murders

and created a climate of fear. Given the intensity of his crimes the public largely wanted severe punishment and retribution, which they saw as necessary after the suffering he caused. But as the death penalty had been abolished in 1965 Sutcliffe could not have been executed even if the public desired it. After his conviction many conversations then occurred as to whether the UK should reinstate the death penalty for cases like these. Even though he had a mental health condition, many argued the severity of his actions overshadowed his schizophrenia. The public focused on the harm he caused rather than his diagnosis. But human rights activists argued that mentally ill offenders should receive treatment.

We realise the inconsistencies in how different legal systems handle mentally ill crimes, as we can compare this to Richard Chase, known as the "Vampire of Sacramento", who in 1978 committed a series of brutal murders. His defence team argued he was not fully aware of his actions due to his mental illness of schizophrenia. He was convicted and sentenced to death, and later died by suicide in prison through overdose before he could be executed by lethal injection. His suicide meant he never had to feel a life long punishment and this caused question of whether an execution would cause public outrage, as it reflected broader debates about the death penalty and weather it truly serves justice or merely fuels societal divisions.

The case of Sutcliffe argues that, although his actions took away the lives of thirteen women, he was a victim of a severe mental illness, possibly due to genetics, environment or psychological factors. The debate is still ongoing as psychiatrists. among others believed that delusions and hallucinations influenced his violent actions. While the judge and large sections of the public believed he was fully aware of his crimes, even though some psychiatric symptoms were present. His case also highlights the dangers of criminals evading punishment due to mental health claims and raises concerns when such defence allows dangerous offenders to avoid full accountability of their actions. Overall, Sutcliffe highlights several issues in the section of mental health, criminal justice and legal rights, and how difficult it is to balance the criminals' needed treatment and ensuring public safety.

From Pathology to Identity: The Shifting Landscape of Psychological Norms

Ezi Uraih

For centuries, a woman's ambition, anxiety or even passion could land her in an asylum. Doctors would call it hysteria – today we just call it human. Women were diagnosed with hysteria for a range of behaviours, from expressing strong emotions to simply having sexual desires. Many treatments for hysteria included forced institutionalisation, bed rest, and even surgical procedures such as hysterectomies.

Psychological norms refer to the behaviours, identities and neural states considered typical or acceptable within a given society. These norms are not fixed; they evolve alongside cultural values, scientific discoveries, and shifting social attitudes. What was once seen as a disorder- something to be treated or or corrected- can, over time, become recognised as a natural variation of human experience. The history of psychology is filled with such shifts, revealing more about societal fears and biases than about the people labelled as abnormal.

Psychological labels are influenced by cultural values, and many identities once labelled as disorders are now recognised as valid aspects of human diversity, attributes to be embraced rather than extinguished.

Throughout history, psychology and psychiatry have shaped our notions of what's considered normal. From old asylums to modern diagnosis manuals, these definitions have often reflected society's fears more than actual science. People in power have used psychology to control those who don't societal expectations- whether that means labelling women as hysterical, treating homosexuality as a mental illness, or calling neurodivergence a disorder. In this evolution of psychological treatment, it becomes clear that psychology doesn't just describe people- it also reflects the world around them.

An interesting case of mass hysteria comes from Gloria Ramirez, a 31-year old woman from Riverside, California. Ramirez was admitted to the emergency room on February 19th 1994 due to complications from late stage cervical cancer. When she arrived at the emergency room many strange symptoms were recorded, such as a garlic or fruity smell coming from her body, an oily sheen on her skin and her blood smelling like ammonia, in which medical staff could see crystals forming. 23 medical staff treating her collapsed, experiencing dizziness, nausea and temporary paralysis.

Officials quickly blamed mass hysteria, suggesting medical staff panicked due to stress, echoing this aforementioned historical pattern of discrediting women's symptoms. However, this explanation was contested because many of those affected suffered from direct physical symptoms, including fainting and muscle spasms. This case highlights how medicine often defaults to ludicrous psychological explanations rather than recognising its own limitations.

The transformation of psychological norms has been largely driven by social movements challenging outdated classifications and demanding recognition of identity over pathology. The LGBTQ+ rights movement played a key role in the removal of homosexuality from the DSM (The Diagnostic and Statistical Manual of Mental Disorders) in 1973, demonstrating that sexual orientation is not a disorder but a natural part of human

diversity. Feminist activism exposed how diagnoses like 'hysteria' were used to dismiss and control women rather than address their actual health needs. More recently, the neurodiversity movement has worked to reframe conditions such as autism and ADHD as cognitive differences rather than medical defects, advocating for acceptance over forced treatment. These movements have not only reshaped the field of psychology, but also highlighted the ways in which medical classifications reflect broader social values and power structures. The evolution of psychological norms is not just a matter of scientific progress,it is a reflection of cultural change and the ongoing struggle of persecuted minorities for recognition and inclusion.

To prevent history from repeating itself, psychology must recognise that its definitions of 'normal' are not objective truths, but reflections of our own ingrained bias and prejudice. Moving forward, the field must approach mental health with humility, acknowledging past harm and ensuring that diagnoses do not medicalise identities. This requires ongoing careful examination of diagnostic standards, greater inclusion of diverse voices in research, and a shift from control-based models of treatment to approaches that prioritise autonomy and lived experience. The lessons of the past show that psychology is most dangerous when it claims to be neutral while simultaneously reinforcing social hierarchies. True progress will not come from drawing rigid boundaries around what is considered normal, but from embracing the full diversity of human experience.

In conclusion, the history of psychological norms highlights how they are influenced by cultural biases, power dynamics and changing social attitudes. As society continues to progress, it is crucial that psychology evolves to better reflect the complexity of human experience rather than reinforce outdated, exclusionary classifications. The ongoing work of social movements and the rethinking of psychological norms shows that the field has the potential to be a tool for inclusion rather than division. By embracing diversity and challenging the limits of past definitions, psychology can move toward a more accurate, compassionate understanding of mental health and human identity.

PHYSICS

"A wise man once said, "Convention is like the shell to the chick, a protection till he is strong enough to break through" – Learned Hand

"Physics, to me, is the most fundamental convention in the entire universe. It explains everything, and everything is based on the conventions discovered by physicists like Newton and Einstein. Everything you do in your daily life, such as watching TV, cooking a meal, or listening to music, is the result of physicists breaking the conventions of their time to develop new technologies, theories, and concepts, advancing humanity one day at a time. The physics section of the literary magazine highlights a few of the concepts, people, and ideas that have challenged the conventions of classical physics and societal norms of the past. When these conventions and laws of nature are altered, society must adapt to accommodate them, as nothing can overrule the laws of physics, which can underpin the entire universe, even though it may not appear as simple as it seems"

Lilly Cook, Lower Sixth
Section Editor

Digital Dimensions: Exploring the Physics of a Simulated Universe

Owen Morriss

What if we were, in fact, living in a Matrix-like simulation today? Could we tell? At a first glance the idea seems absurd - how could we be in a simulation? However, as we delve into the realm of quantum mechanics and the discoveries of Max Planck, it begins to intrigue even the most sceptical of scientists. In this article, we will be exploring if modern day physics lends any credibility to the simulation hypothesis.

The simulation hypothesis, first proposed by Nick Bostrum in a paper titled "Are you living in a computer simulation", makes us question our very reality by introducing the concept that we could in fact just be constructs, whose experiences and self-awareness stem from a simulation rather than true reality. In his paper, Bostrum laid out three propositions, of which he argued one must be true:

1. Human civilisation or any comparable civilisation is unlikely to become advanced enough to start simulating other realities, or some law of physics prevents their existence.
2. A civilization that did manage to achieve technological advancement would not simulate a large enough number of realities for it to be likely for us to be in one.
3. Any entities who are experiencing a reality and are "conscious" are almost certainly in a simulation.

Whilst these are philosophical questions, they provide a basis to explore the physical structures of reality and whether current conventional conceptions of our universe are in fact the truth or just our misconstrued ideas.

The building blocks of our Universe, real or code?

In 1899 whilst investigating black-body radiation, a German Physicist by the name of Max Planck proposed a series of physical constants (known as the Planck units), that govern the smallest possible things that can exist in our universe. This revolutionary concept introduced a discrete value of space, the Planck length, rather than the continuous scale we once believed; along with the Planck length, there was another Planck unit, Planck time. This gave us quantified time as well. This meant that spacetime - the concept that there are our normal 3 dimensions and then the 4th dimension of time. Just like how images on a computer screen are rendered from tiny little pixels, our universe could be constructed from these discrete values, or "pixels" of spacetime. This concept-whilst far reaching- introduces an interesting parallel to how computers operate.

When Quantum mechanics meets simulation.

Just as pixels form images on a screen, Planck length and Planck time suggest a finite size to our universe. The probabilistic nature of quantum mechanics can at times almost seem like a computer game, rendering on demand (this is when only things that are on the screen are loaded). When observing how things interact on a quantum level, the outcome is not determined until it is observed; a good example of this is the double slit experiment. First performed in 1927, the experiment

showed that when electrons are fired at two very small splits, they form an interference pattern - where some waves cancel each other out and others merge distinctive patterns - on the other side precisely like light waves do. However, if you were to put a detector so that you could observe the path of each electron, the interference pattern changes, and you are instead left with only two places where the electrons have ended up just as if they were individual particles. This distinct change in behaviour based purely on whether they are being observed or not has led some theorists to speculate that if we are in fact in a simulation then this is how the creators optimised it. This, however, is far from definitive proof and serves more as wild theories to base thought-provoking questions.

Furthermore, this idea has far-reaching implications, both in physics and further afield, in fields of philosophy. If our universe was in fact just a simulation, it would explain a few things about it - such as why all the fundamental constants are so seemingly random. If we were in a simulation this would be because they were just the numbers that were picked; perhaps this was because they maximised the possibility of life or perhaps, they were used for experimentation to see how different fundamental constants affect the workings of the universe. How does this affect thoughts on free will, consciousness and our feeling of self-importance? However, when debating topics such as this one, the line between physics and philosophy begins to blur, scientists becoming philosophers and vice versa.

People have been questioning our reality ever since Plato wrote his allegory of the cave - in which he describes a situation where a group of people who are chained up in a cave can only see shadows cast on the wall which they mistake as true reality. Plato's allegory allows us to consider that we are in fact the people trapped inside the cave. Until we start considering that fact, we will never discover whether this is true reality. The Aztecs, who also questioned reality, theorised in their philosophical texts that reality was in fact a painting, or book written by the Teotl (sometimes translated to God). In more modern times, the age-old question is often portrayed in popular culture through films such as The Matrix – in which reality is reimagined as a simulation run by aliens that a small crew manage to escape from. Whether we are considering the allegories of Plato or the modern, futuristic take shown in cinema, the simulation hypothesis allows us to ponder the very nature of existence. Even if the simulation hypothesis turns out to be merely just a thought experiment, it provokes thought about what it means to be a conscious being in our Universe.

The simulation hypothesis is an exciting proposition - whether you think it has any credibility or not. It is a fun blend of ancient philosophy with modern-day physics and culture. Whilst the scientific evidence is inconclusive for a simulation's existence or lack thereof, it does trigger queries on what it means to be conscious in our cosmos. Even if we never find definitive proof, exploring these ideas deepens our understanding of reality and consciousness and gives us a reason to delve into the possibility that our universe does not follow the conventional laws we currently think it does.

Is Anyone Out There? It Seems Eerily Quiet

Rosa Hughes

The existence of aliens has always fascinated humans. Even though our technological capabilities are continually expanding, there is still no concrete evidence to answer the question of whether we are alone in the universe. So what is truly out there, and why haven't we found anything yet?

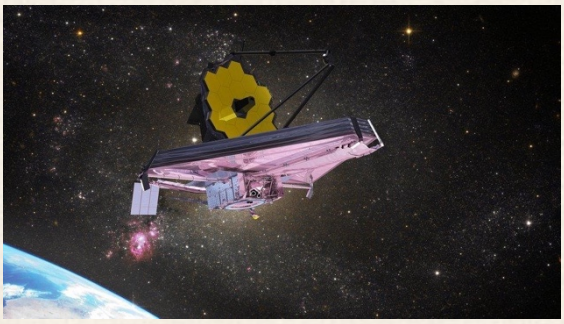
"Two possibilities exist: either we are alone in the Universe or we are not. Both are equally terrifying."
- Arthur C. Clarke, science fiction author and Planetary Society member-

What might extraterrestrial life look like?

What does the word 'alien' mean to you? What do you picture? Is it the oversized blue head of Megamind? A lost creature with a glowing finger like E.T.? Or perhaps a small green being with big ears that can use the Force? Many of our preconceptions about aliens are fuelled by Hollywood and science fiction, so much so that their conventional idea of aliens is globally recognised. The image of slimy green skin and bulging black eyes has become synonymous with the idea of extraterrestrial life. This is the basis upon which the conventional design of aliens has been forged. However, astrobiologists studying the existence of these life forms expect to find much smaller results than the images Hollywood would have us believe.

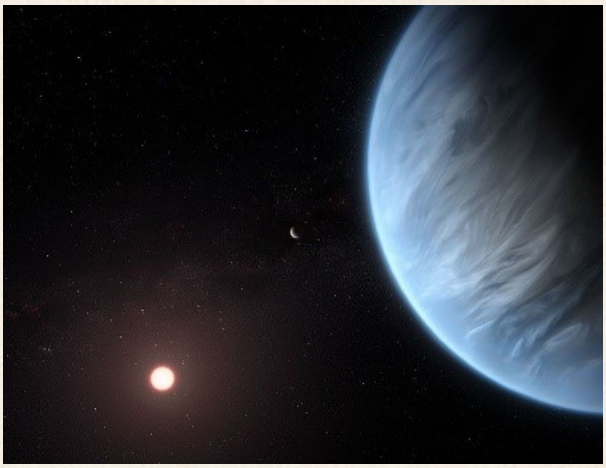
Looking at the evolution of life on Earth, the most likely form of alien life is microscopic, as it was for the first 3 billion years of life's existence on Earth. If we scale down to this level, microbial life thrives in even the most inhospitable environments, including acidic pools and thick beds of ice. Due to this ability to exist in such an enormous variety of harsh conditions, they are the most likely organisms to be found on other worlds. Rather than looking for intelligent, evolved life, this knowledge has led researchers to shine a spotlight on processes linked to primary organisms. By looking for signs of biological processes such as the gases present in the atmosphere that only living beings tend to produce, scientists may yet find life outside of our solar system.

In 2020, a team of scientists conducted by Professor Greaves used the James Maxwell Telescope in Hawaii to confirm the apparent existence of phosphine in the atmosphere around Venus, a gas which could theoretically be produced by a living being. However, scientists eventually concurred that not even bacteria could exist in the clouds of Venus, as they are too dry to support life.



More recently in 2023, NASA's James Webb Space Telescope revealed the presence of carbon-bearing molecules including methane and carbon dioxide on K2-18 b. This is a planet which is 8.6 times larger than Earth and situated 120 light years away. The first insight into the atmospheric properties of this exoplanet came from NASA's Hubble Space Telescope. Dimethyl sulphide has also been detected, which on our planet is only produced by the presence of life in the form of marine bacteria. The observation of these gases on K2-18 b could mean that the planet

has a water ocean-covered surface much like Earth, and as we know, water hosted many of Earth's earliest life forms.



How does this telescope work? It is able to analyse the light that passes through planetary atmospheres by deciphering the chemical signature of molecules contained in the light present. When pure white light is refracted in a prism it is split into a rainbow spectrum, and the telescope uses a method similar to this. If parts of the spectrum are missing, this means it has been absorbed in the atmosphere by the chemicals present. This process has managed to be conducted from over 1.1 million billion kilometres away, so the amount of light reaching the telescope is considerably small. It is bizarre to think that we have no visual pictures of what this planet looks like, but we are able to decode the components of its atmosphere. These preliminary findings have understandably excited scientists seeking to find evidence of alien life in our universe, even though space exploration at this distance is still in its infancy.

1 in 20 Billion Trillion? What are the chances!

Our Milky Way is thought to contain at least 100 billion stars, and the observable universe may contain more than 2 trillion galaxies. As research has developed, we have discovered the existence of 5380 confirmed exoplanets in 4354 planetary systems outside of our own solar system. Considering moons can also be hospitable to life, this leaves over 20 sextillion (that's 20 billion trillion!) planets on which life forms may exist. With this many prospects, surely it is impossible for Earth to be the only planet harbouring intelligent life, or was it truly a one in 20 sextillion chance?

"The universe is a pretty big place. If it's just us, it seems like an awful waste of space"
- Carl Sagan, American astronomer-

There is one key question that scientists return to: if intelligent life does exist elsewhere in the universe, why hasn't another life form been in contact? The Fermi paradox summarises this position. Named after Enrico Fermi, a Nobel prize winning physicist, it describes how, given the age of our solar system, we really should have heard from aliens by now if any were actually out there in space. Our solar system is roughly 4.5 billion years old. This may seem ancient, but the rest of the universe has existed for 13.8 billion years. If aliens exist, they have had a lot longer than us to develop communication systems and technology and should be able to reach across different galaxies to say hi.

If these civilisations had spaceships able to travel at 1% of the speed of light, the galaxy could have already been colonized 1,000 times. The fact that we are yet to detect anything suggests that such advanced alien life is uncommon, or that we are too far away to detect these signals with the technology available to us.
However, as we are developing our own devices to allow this level of communication, we are also developing nuclear power, warming our climate, causing the mass extinction of species, and exhausting our resources to a point where the damage is irreversible. Is it such a stretch to assume we are following in the footsteps of previous alien

civilisations and destroying our own planet before we can communicate with others?

Ultimately, convention tells us that there must be life outside of our solar system, that the chances of Earth being the only planet to harbour intelligent life is so miniscule, it must be impossible. Not only that but it tells us what that life should look like. However, there is currently no hard evidence to support these conclusions, and we are still light years away from a concrete answer. Convention might say that we are not alone, but as of yet the universe does seem eerily quiet.

The Mystery of Space and Time

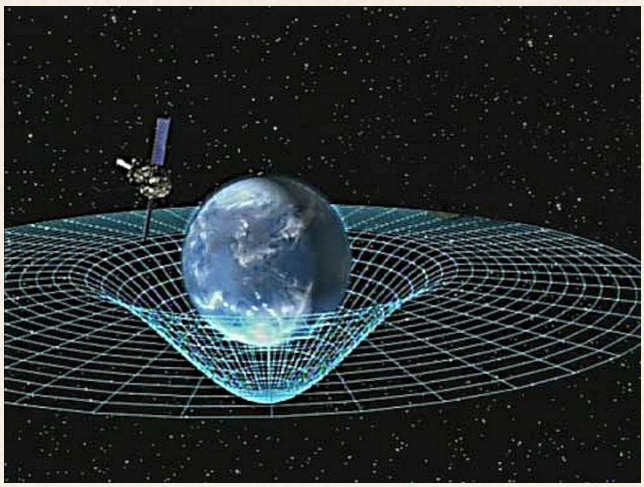
Lilly Cook

"Nothing troubles me like space and time. And yet nothing puzzles me less than space and time, because I never think of them"- Charles Lamb

In the past, space and time were considered absolute and independent, unaffected by external forces or matter. However, Einstein's theory of relativity shattered this theory and demonstrated that space and time is instead a dynamic, interconnected continuum that can be warped by mass and energy (known as "spacetime"). Matter and energy curve spacetime, influencing the flow of time and the curvature of space. This essay will explore the principles of relativity, its real-world applications, and its potential implications for future technological advancements.

In the late 1600s, Isaac Newton established the foundations of classical mechanics in his *Principia*, introducing the concepts of absolute space and absolute time. Space was regarded as a fixed, unchanging, and infinite backdrop, existing independently of matter. Similarly, time was considered absolute, flowing uniformly regardless of external influences; according to Newton, time would pass identically everywhere, unaffected by motion or external conditions.

However, in 1905, Albert Einstein revolutionised physics by introducing the theory of relativity, fundamentally altering our understanding of space and time. No longer



seen as absolute and linear, spacetime became a dynamic, flexible continuum that could be stretched, warped, and curved by the presence of mass and energy. According to general relativity, gravity is not a force, as Newton proposed, but rather the curvature of spacetime itself. This idea was proven by the study of massive objects, such as planets and stars, observing that they would attempt to follow straight lines or paths through spacetime - yet instead their paths would appear curved due to gravitational influence. Since space and time are intertwined, any curvature of space inherently affects time as well, giving it a shape and direction.

General and special relativity

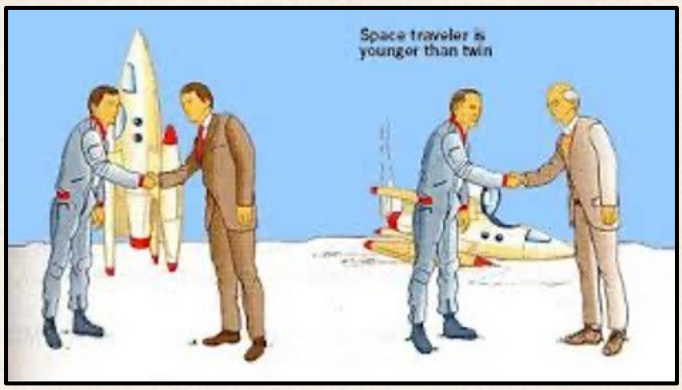
General relativity, describes that gravity not only pulls all things with mass towards each other but that it also warps and pulls spacetime, so gravity can be said to be the curvature of space-time itself. Huge objects, such as stars and planets, warp the fabric of space-time, creating what we perceive as gravity. The greater the mass of an object, the stronger its gravitational field, and therefore the more it would distort or change spacetime, this is known as time dilation. So essentially, if you are in an area of super-high gravity, like a black hole, time would run slower and the effects of time dilation would be so significant that a single minute near the event horizon

could be equivalent to decades passing on Earth.

To see how this works, we can use the example of global positioning system (GPS) satellites. These satellites orbit Earth at an altitude of 20,200 km, where the gravitational field is slightly weaker than on the planet's surface. As we discussed before, time runs slightly faster in weaker gravitational fields due to reduced spacetime curvature. As a result, the atomic clocks on the GPS satellites tick 45 microseconds faster per day than identical clocks on Earth. Engineers then have to apply relativistic corrections to account for this discrepancy, demonstrating the real-world significance of Einstein's theory.

Special relativity describes how objects moving at very high speeds (close to the speed of light) experience time differently. This is due to two things: First, that the laws of physics are the same for all observers in uniform motion (i.e. not accelerating), and second, that the speed of light in a vacuum (C=3x10^8) is constant for all observers regardless of their motion. These two ideas lead to some strange and unexpected effects, such as time dilation, length contraction and relativity of simultaneity.

To explain this, the Twin paradox can be used. Imagine two twins, Alex and Bob, who both experience the passage of time the same whilst at rest on earth. Then Alex leaves on a space journey, travelling close to the speed of light, whilst Bob remains stationary on earth. Alex travels for a long time, then turns around and comes home at very high speeds. When Alex returns to earth, he finds that Bob has aged more than he has, so he has experienced much less time. This result seems paradoxical as if you consider that Alex is the one at rest from her perspective, then it would be him who is ageing more slowly. In special relativity, time dilation only occurs when an object moves at high speeds relative to another observer. Yet Alex must decelerate, stop, turn around, and accelerate again to come back. This motion means that Alex's point of reference is non-symmetrical to Bobs, therefore leading to discrepancies in how they experienced time.



Time dilation has been proven again with the use of atomic clocks traveling in airplanes, as when they travel up to speeds 580 miles per hour, the clocks would tick slightly slower and show a measurable time difference when they return.

One of the most famous consequences of special relativity is E=mc^2, Einstein's relativity
equation, which fundamentally changed our understanding of physics, leading to breakthroughs in nuclear, particle and cosmological physics, as it reinforced the idea that mass and energy are two different forms of the same fundamental essence.

Practical applications

1. As discussed earlier, GPS must account for the time dilation caused by relativity. Without corrections through relativistic calculations,. GPS signals would have significant errors, leading to inaccurate positioning.

2. Helps explain planetary motion previously thought to be elliptical, yet through relativity, it was

revealed that massive bodies like the sun would warp space time, causing the planets to follow curved paths.

3. Explain the mechanics of our universe on a large scale. black holes, for instance, are regions of extreme space-time curvature where gravity is so intense that not even light can't escape. And also, the bending of light by massive bodies. This demonstrates relativity's role in shaping our understanding of the universe.

4. In the future, it may also help with the advancement in technologies allowing us to travel through universes, in which we would need to take into account the discrepancies in how those on earth and those traveling through space experience time.

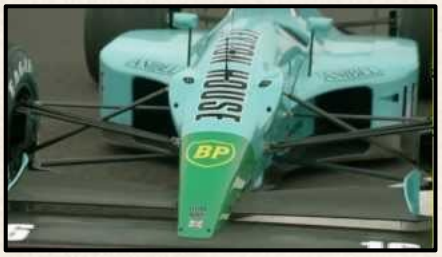
In my opinion, time is the most important fundamental construct of our universe and existence. Yet, the conventional understanding society holds lies rooted in an oversimplified Newtonian perspective to serve our social and practical needs. However, with scientific advancements in fields like quantum mechanics, GPS and space travel. The distinction between time as a physical phenomenon and time as a human convention will become more evident, thus challenging us to reconcile these perspectives in both scientific and social contexts, forming a new understanding of time, one that's fluid, dynamic and everchanging.

The Shape of Speed

Finn Haisley

Aerodynamics studies the movement of air and how it interacts with bodies moving through it. Its application in motorsport and automotive engineering cannot be understated, as the guidance of air around the surface of the vehicle and through its systems is closely related to its performance; poor aerodynamics can deduct valuable seconds from lap times in racing and can decrease both fuel economy and efficiency, which are both relevant factors for motorsport and everyday applications.

Adrian Newey is the most successful designer in Formula 1 history, with an unparalleled record of 12 Constructors' Championships, 13 Drivers' Championships, 532 podiums, and 220 Grand Prix wins. Doubtlessly the leader of his field, he earns £20 million per year, a reflection of his unique ability to guide the air, precisely how he intends, around the car to gain a significant performance advantage.



One of Newey's key design trademarks is the fully integrated front nose, a motif which can be seen throughout his career. His cars often feature this V-shape at the driver's feet, an aerodynamic trait that enhances airflow management by better cutting through the air at the front of the car. What sets Newey apart is his ability to picture how air will flow around and through the car, rather than relying solely on simulations and data. This intuitive mastery of his discipline allows him to extract

maximum performance from the car, keeping in line with the uncompromising regulations and yet simultaneously evolving his designs. A prime example of his aerodynamic genius is his use of Venturi tunnels. These channels accelerate air flow beneath the car, creating an area of low pressure that effectively sucks the car into the ground, dramatically increasing grip without sacrificing valuable speed to drag. When ground effect (reducing the distance between the bottom of the car and the ground) returned to F1 in 2022, many teams struggled with proposing, a violent bouncing effect caused by aerodynamic instability. Newey's proficiency in regards to developing Venturi tunnels meant that he got the balance right, ensuring Red Bull's cars suffered far less from the issue than their rivals. In Formula 1, aerodynamics is pushed to the absolute limit. A modern F1 car can generate up to five times its weight in downforce, allowing it to corner at extreme speeds while remaining glued to the track. Some of the most innovative aerodynamic designs in F1 history have come from bold experimentation.

One such example is the Brabham fan car. This 1978 design used a rear-mounted fan to suck air from beneath the car, creating a low-pressure zone that maximized grip. These used electrical energy to turn the fan to create low pressure which meant more air from beneath the car was forced to rectify this pressure deficit. The concept was so effective that the car won its only race, before being swiftly banned. Conversely, the Venturi tunnels are built into the underside of the car,

hence requiring no energy input to generate the same effect.

Another groundbreaking development was Williams' FW14B. This car featured an active suspension system, which continuously adjusted the car's ride height to maintain optimal downforce and drag levels throughout a lap. This revolutionary technology helped Nigel Mansell to dominate the 1992 season and secure the World Championship with ease.

Innovations in Aerodynamics

- McLaren Speedtail

The McLaren Speed tail is a testament to the power of aerodynamics in road cars. As McLaren puts it, "Air is channelled without interruption over, under, and around the body." The car's near-teardrop shape with its elongated tail is designed to minimize drag, making it one of the most aerodynamically efficient hypercars ever built.

A key innovation of the Speedtail is its flexible, lightweight carbon fibre ailerons, seamlessly integrated into the bodywork. Ailerons are flaps which can be extended and retracted

such as those found on the wings of aeroplanes to regulate aerodynamics. These act as dynamic balance aids, adjusting airflow over the rear of the car and even functioning as airbrakes. When extended, the flaps increase the exposed surface area of the car, creating a buildup of air striking the body known as drag. This drag reduces the car's ability to move through the air as effectively. Reading this, it may seem counterintuitive to include these ailerons, however creating these areas of drag can slow one side of the car down whilst the other maintains its velocity, improving turning effects. This unique concept, found only on the Speedtail, gives the car its name, unparalleled performance and striking appearance.

The Porsche 956 – A Masterclass in Aerodynamics

Beyond F1, some of the most impressive aerodynamic feats have been achieved in endurance racing. The Porsche 956 is one of the greatest examples of this. Designed for Group C racing, it was a dominant force, winning seven times at the 24 Hours of Le Mans and six times at the Daytona 24 Hours; it racked up a total of 39 World Championship races.

The car also set one of the most legendary records in motorsport history. In 1983, Stefan Bellof took the Porsche for a rather notable lap of the Nürburgring Nordschleife. The notorious Nürburgring Nordschleife is the longest track in the world, boasting 12.943 miles of sweeping tarmac, 154 nail biting turns and over 300 metres of elevation. This combination of danger and high speed requires driving excellence and a healthy measure of luck. With this in mind, alongside

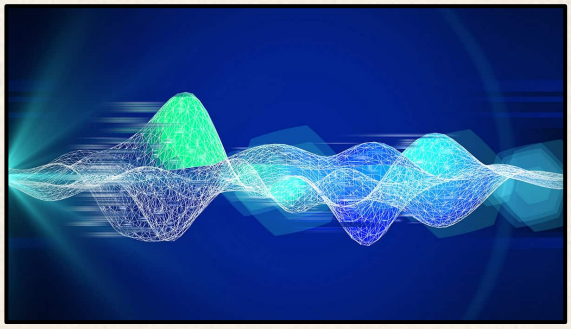
the previous track record of 6 minutes and 58.6 seconds set by racing legend Niki Lauda, Bellof completed his lap in an incredible 6 minutes and 11.13 seconds, a record that stood for the next 35 years. With a top speed of 225 mph (362 km/h), the 956 was as fast as it was efficient.

However, what makes the 956 truly remarkable is its downforce generation. The car produces so much aerodynamic grip that, in theory, it could drive upside down on the ceiling at speeds above 321.4 km/h.
This incredible feat is acknowledged at the Porsche Museum in Stuttgart, where the car is suspended from the ceiling, symbolising its ability to defy gravity.
From Formula One to hypercars to endurance racing, aerodynamics has always been integral to the performance of these high-octane machines. Newey's intuitive grasp of airflow has heavily influenced some of the most successful cars at the pinnacle of motorsport, whilst unconventional cars such as the McLaren Speedtail and the Porsche 956 drive the boundaries of aerodynamic efficiency and innovation to this day; all working within and sometimes challenging established conventions. Be it on the track or on the road, the capability to send air precisely where it is wanted separates the greats from the rest.

When Conventions Collapse: The Multiverse and the Limits of Physics

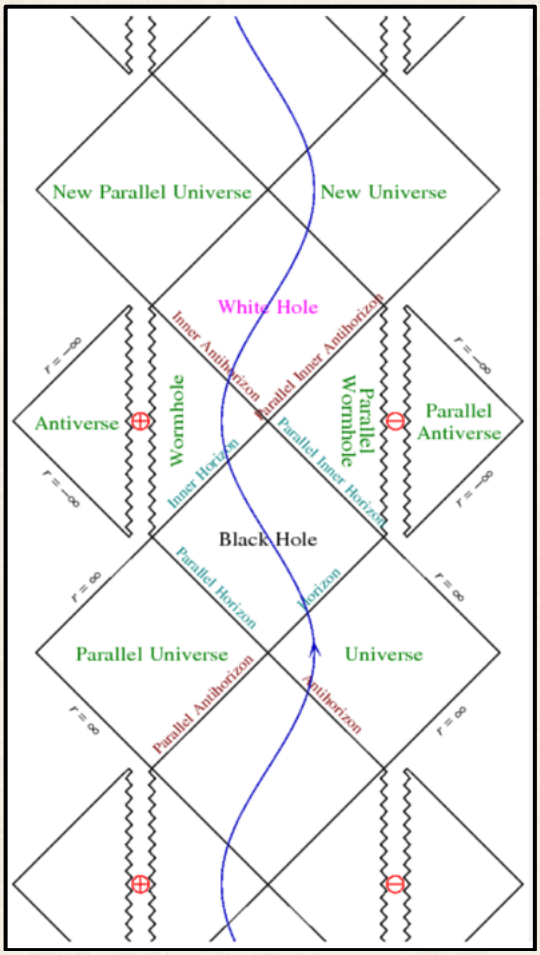
Ella Clayton

We've all heard of parallel universes – they're a common trope in science fiction, ranging from Doctor Who to Star Trek and beyond. But is it really possible? Are there parallel universes out there, a complete antithesis to our own, outside of the laws of physics we know, outside of the traditionally accepted conventions of our universe?



You may have heard of string theory: it has been previously hailed the 'theory of everything' but is just one amongst many of the theories developed to try and unify general relativity - Einstein's description of the curvature of spacetime that hence causes gravity - and quantum mechanics - this describes the behaviour and characteristics of particles plus their related phenomena. String theory is a mathematical framework that describes the different elementary particles, such as electrons and quarks, as manifestations of the different modes of vibration of one-dimensional strings, that determine the particle's properties like charge and mass.

However, for the maths to work, scientists were forced to assume that there are 10 dimensions. Yet from our perspective, we still only observe 3 dimensions plus time. To describe the extra dimensions, we say that at every point in our universe there is an associated curled up 'ball' of 6-dimensional space, too miniscule to ever detect, called a Calabi - Yau manifold. The trouble is there are billions, or even trillions, of different manifolds that could be created, depending on the exact manner in which the dimensions are curled up in, with each configuration affecting how the strings within them vibrate and consequently how the particles behave. Therefore, each manifold produces a different universe with its own set of physics, leading scientists towards a proposition of the multiverse. This profligacy is widely considered string theory's fatal flaw and is the one of multiple reasons it has now been mostly discarded as a theory. Furthermore, it is practically impossible for string theory to be tested experimentally, as it makes so many contradictory predictions, but nevertheless it doesn't mean the possibility of a multiverse has also been disqualified.



Kerr black holes - black holes that are spinning in eternally empty space - are intriguing, because

unlike traditionally thought of black holes, the singularity in a Kerr black hole is a ring rather than a singular point, owing to the fact it is rotating. Immense quantities of matter collapse in on itself into an infinitely dense point, and this is known as a singularity, which is thought to be at the centre of every black hole, where the known laws of physics break down. Yet in a Kerr black hole, the hypothesis that Roy Kerr proposed, due to the black hole's angular momentum (the fact it spins), the singularity is stretched out into a ring, as described by his solution to Einstein's equations of relativity for this type of black hole: the Kerr metric.

Theoretically, it is possible to traverse through this ring singularity, through a wormhole and emerge out of a white hole into another universe; there are an infinite number of these universes, nested inside each other like Russian Tardis dolls. You may be able to picture this more easily with the assistance of the Penrose diagram to the right, where each diamond on the edge represents an infinitely large universe and the zig zag vertical line denotes the ring singularity of the black hole. If we cross the singularity, we end up in an antiverse where the equations tell us that gravity pushes instead of pulls: anti-gravity, but it is worth noting this is highly speculative and not widely accepted. Furthermore, a white hole is, in simple terms, the reverse of a black hole – a region of spacetime that nothing, not even light can enter.

Unfortunately, the likelihood of this infinite tower of universes existing is rather low, since the Kerr solution to general relativity assumes eternal black holes with no other matter to distort spacetime, yet we have our own solar system as evidence that this is not the case: we are matter, proving that the universe is not empty and that black holes are not eternal, therefore Kerr black holes cannot exist as they rely on the principle that they are eternal. Also, we must remember that a black hole is formed from collapsing matter, effectively blocking any potential portal to another universe.

What would it be like to be in these hypothetical universes though? Certainly unconventional, but in what respect? The simple truth is we don't know. Currently, there is no known way to directly observe or travel to a parallel universe, making both their existence and properties highly speculative. Perhaps there could be variations in fundamental constants that we rely on in our universe – even the smallest change could have a drastic impact. For example, the permeability of free space is a physical constant used in the topic of electromagnetism, describing how a magnetic field interacts with a vacuum.

On first inspection this doesn't seem especially important but find out more and you'll see that this is directly related to the speed of light, the speed all waves on the electromagnetic spectrum travel at in a vacuum. The permeability of free space plays a crucial role in the overall behaviour of light and electromagnetic waves; consequently, if it were to be altered even slightly, our universe would be very significantly different. Magnetic fields created due to a current would be stronger or weaker depending on how the constant changed, meaning even everyday objects like speakers that rely on the principles of electromagnetism wouldn't function quite as well. Additionally, the speed of light would differ, therefore so would the refraction of light through different mediums changing how we see things, and the vast astronomical distances we measure in light years (the distance light travels in one year) would now all be wrong. This is only one out of the multitude of constants used throughout physics, and in a parallel universe any or all of them could vary, leaving our beloved laws and conventions of Newton, Kepler, Einstein and more void, worthless, and wrong.

Despite the numerous theories, we are still yet to find proof of the existence of multiple universes, but that's not to say we should rule them out - who knows what's really out there. Think about how far we have progressed in the last 100 years - until 1911 they still thought an atom was shaped like a plum pudding, which if you weren't aware couldn't be much further from the truth - so who knows what we will discover in the next century? This is a transformative era for physics, as there is so much still unknown about our universe: parallel universes, alternate dimensions and black holes are only the beginning.