

# BEYOND THE *BUBBLE*

**THE PAST TODAY**

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# FROM THE EDITOR

Hello and welcome to this term's edition of 'Beyond the Bubble'!

As the school year begins to draw to a close, I know a lot of us have been reflecting on the highs and lows of the past year- especially those of us that are leaving the school. Whether it be a small decision that you now look back on as having a big impact or something new you've tried out and actually stuck with, it's no secret that our past experiences play a massive part in shaping our present realities: that's why this time we've decided to focus on how the past effects our lives today. From articles on the development of Pokémon to how the Covid pandemic links to previous disease outbreaks and even a piece discussing time itself, we've looked at both the good and the bad, taking a deep dive into the past. Hopefully reading some of these articles will encourage you to do the same and take this time to reflect and grow too.

This will be my last edition as editor of 'Beyond the Bubble' as my time at Herschel comes to an end: I've really enjoyed editing and writing for the publication over the past two years and working together with other members of our lovely team. I know you're in safe hands with the new editor, Tanisha Shah, and thank you all so much for reading!

I hope you enjoy reading!

*Sanchali Greelan*



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# Shattering Stereotypes: Aunty Skates Revolutionary Roll

By Nidhi Pandit



Oorbee Roy, known affectionately as Aunty Skates, a trailblazer who defies conventions with her unyielding spirit and zest for life. Raised in the vibrant cultural tapestry of New Jersey, USA, her journey led her to the bustling streets of Toronto, Canada, where she now calls home. Her professional odyssey traversed the realms of computer science and engineering, spanning from the prestigious halls of Bell Labs to the dynamic landscape of Wall Street. Yet, despite her professional success, Oorbee sensed a void waiting to be filled. Inspired by her husband's passion for skateboarding, she embarked on a remarkable journey of self-discovery. Through her TikTok alias @AuntySkates, she challenges stereotypes and societal norms, carving out a space where age, gender, and cultural expectations hold no sway. As Aunty Skates, she not only charts her own path but also paves the way for others, particularly Indian women, to pursue their passions fearlessly and with boundless enthusiasm.

Throughout history, women have been assigned rigid gender roles and subjected to systematic suppression in society. From ancient civilisation to modern times, women have been confined to domestic spheres, their voices stifled, and their potential limited by societal expectations. Across cultures, norms dictated that women should prioritise caregiving, maintain the household and defer to male authority. These gendered ideologies restricted women's access to education, economic opportunities, and political participation, perpetuating a cycle of inequality. Despite these obstacles, Oorbee Roy has managed to conquer it all and continued to embrace herself in doing what she enjoys most: skateboarding.

Aunty Skates stands as a beacon of empowerment and defiance against the constraints of societal expectation. Her courageous journey reminds us that true liberation comes from embracing our authentic selves and fearlessly pursuing our passions. The social media sensation has defied stereotypes and carved her own path. Born into a conservative community where women were expected to conform to traditional roles, she dared to defy these norms.

Growing up, she found solace and freedom in the art of roller skating, an activity deemed inappropriate for girls by the prevailing standards. Undeterred by disapproval from the community, she pursued her passion with unwavering determination. Through her perseverance, she not only mastered the sport but also used it as a platform to challenge gender stereotypes. Aunty Skates became a symbol of empowerment for women, inspiring countless others to break free from the constraints of gender expectations and pursue their dreams. Her journey serves as a testament to the resilience of the human spirit and the transformative power of individual defiance against restrictions in society.

Aunty Skate's defiance extended beyond challenging gender norms; she shattered age stereotypes as well. In a society where older individuals are often expected to conform to a sedentary lifestyle, she blazes her own trail by actively participating in a youthful activity. Her presence on roller skates, gracefully gliding across the pavement in her traditional Indian attire- a vibrant sari- was a revolutionary sight and led to her becoming an Instagram and TikTok sensation! By refusing to be confined by age-related expectations and embracing her cultural identity in her choice of clothing, she challenged the notion that certain activities or attire are reserved for specific age groups. She is inspiring a paradigm shift in how both youthfulness and traditional attire are perceived in Indian society.

By celebrating Aunty Skates, we honour not only her individual triumphs but also the collective resilience of women worldwide who continue to challenge and reshape the fabric of society. As we reflect on her inspiring story, let us all aspire to embody her spirit of courage, determination,

and authenticity. The journey through time has shown us how the past limited women, but it is because of the likes of Oorbee Roy that women in this day and age are breaking boundaries just as the suffragettes paved the way for future leading female figures. For every Women's Day henceforth, let us stand in solidarity, united in our commitment to honouring and uplifting the voices and achievements of women, who inspire us to dream boldly and live unapologetically.



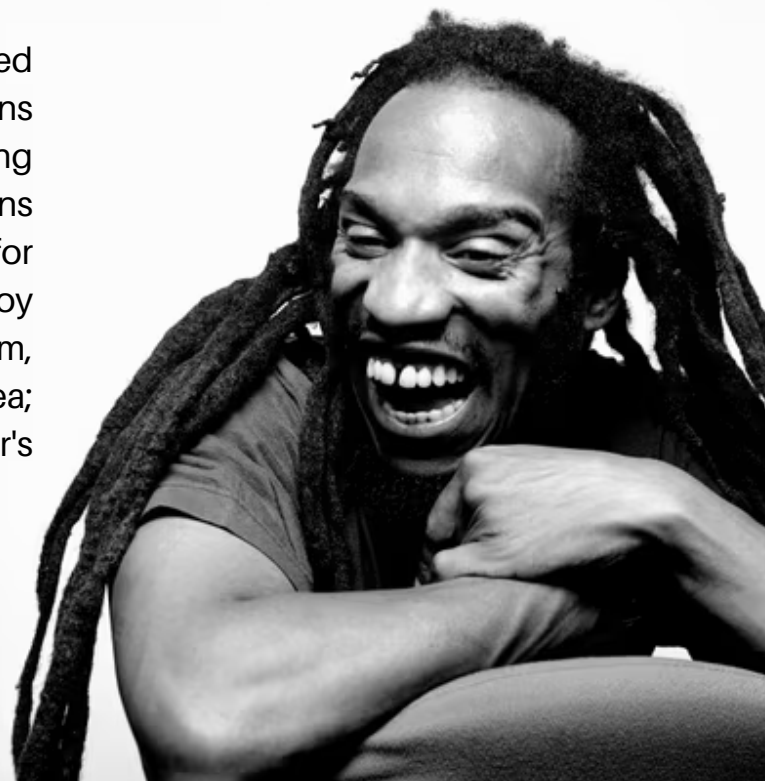
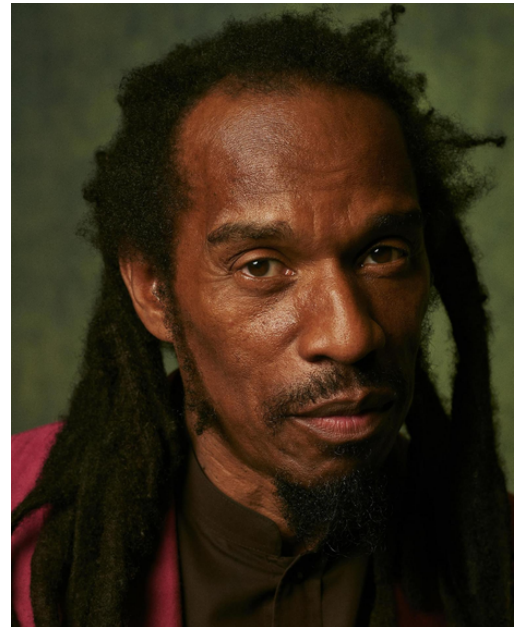
# Benjamin Zephaniah: The Legacy He Left Behind...

by Jannet Ali

Benjamin Zephaniah was born on the 15th of April 1958 growing up in Jamaica and the Handsworth district of Birmingham, dropping out from school at 14, after being expelled from his previous school at 13 due to his dyslexia. He ended up leaving full time education after not being able to read or write, however despite his many struggles with his dyslexia, he began performing poetry at the early age of 11. By the age of 15, he had accumulated quite a few fans in his neighbourhood.

He then moved to London in 1979 and published his first ever poetry collection, *Pen Rhythm*, in 1980. He held the title of Writer in Residence at the Africa Arts Collective in Liverpool and was a candidate for the role of Professor of Poetry at Oxford University. He also holds an honorary Doctorate in Arts and Humanities from the University of North London in 1998, as well as a Doctor of Letters by the University of Central England in 1999. In many of his poems, he writes about helping the oppressed and everyone deserves freedom, as well as raising awareness to poorly treated minorities. He also heavily fought for the BLM movement.

In his second collection of poetry, contained poetry and travelogue. His other poetry collections include two books written for children: *Talking Turkeys* published in 1994 and *Funky Chickens* published in 1996. He has also written novels for teenagers: *Face* published in 1999, *Refugee Boy* published in 2001, the story of a young boy, Alem, fleeing the conflict between Ethiopia and Eritrea; *Gangsta Rap* published in 2004 and *Teacher's Dead* published in 2007.



Zephaniah lived for many years in East London; however, in 2008, he began travelling between a village near Lincolnshire, and Beijing in China. He was a keen language learner and studied Mandarin for more than a decade.

His cousin, Michael Powell, died in police custody, at Thornhill Road police station in Birmingham, in September 2003 and Zephaniah regularly raised the matter and tried to raise awareness, continuously campaigning with his brother (Tippa Naphtali), who set up a national memorial fund in Powell's name to help families affected by deaths in similar circumstances.

Sadly Zephaniahs, short but impactful, inspirational, and talented soul flickered out, and left us to go to a better place on 7th December 2023. He was 65, diagnosed with a brain tumour, eight weeks previously... His friend of almost 20 years (Joan Armatrading), gave a tribute to him on Newsnight on BBC Two after hearing about his death. On X she tweeted: "I am in shock. Benjamin Zephaniah has died age 65. What a thoughtful, kind and caring man he was. The world has lost a poet, an intellectual and a cultural revolutionary. I have lost a great friend."

Truer words have never been spoken, may you rest in peace Zephaniah, you have given us more gifts of Literature than we can ever repay you for, your acts of loyalty standing towards unfair prejudice, we need to be more like you.



Our very own Mr Piggott's children had the pleasure of meeting Zephaniah!

# The Second Scramble for Africa

by Arthur Kepke- Wysocki

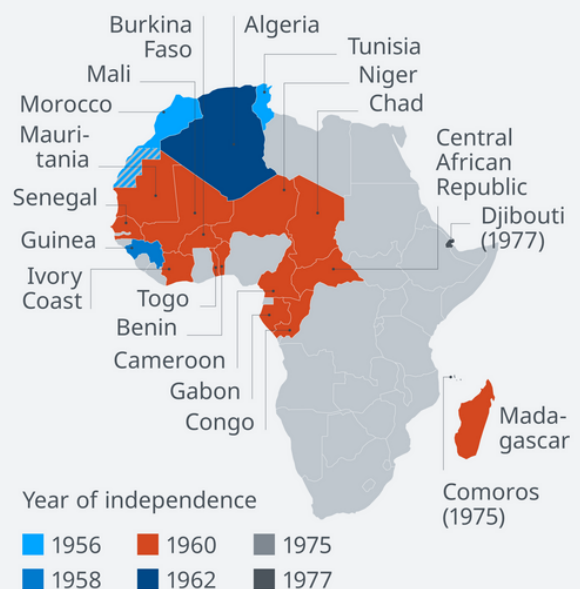
History lessons often teach us that the 20th century marked the end of brutal colonial rule in Africa as many countries began to celebrate their independence. What they do not teach is the tacit control that “former” colonial powers still have today, continuing to ravage the continent for their own gain, even if not as visibly as in the past.

## France

After the French franc was devalued in 1945 following WWII, a new currency, the CFA franc, was implemented in France’s colonies in Africa to spare them the impacts of the devaluation. The original exchange rate against the French franc made the CFA franc slightly stronger such that the colonies could import from France cheaply but would have expensive and undesirable exports. The legacy continues today as 14 countries still use the West African or Central African CFA franc, which is now pegged to the euro. These countries have been forced to store half of their foreign reserves with the French Treasury, meaning they are at the mercy of the European Central Bank, hence leaving them with no wealth or autonomy. In what world could this not be considered colonialism?

### Former French colonies in Africa

by year of independence



Source: DW, NED

Furthermore, many mineral mines in Africa have been taken over by French companies, who bring all of the profits back home whilst the rightful owners of the land remain in poverty. For example, the French government-owned company Orano owns three uranium mines in Niger. With France running on 70% nuclear energy, this means that both the profit and resources are extracted by France, whilst Niger still faces one of the lowest HDI rankings in the world. However, Niger and many other countries have taken a stand against these unjust actions by turning to a new “ally” in the east.

## Russia

There have been numerous coups in former French West Africa since 2010, most notably those in Niger and Gabon in 2023. Whilst this may paint a picture of resilience against the new wave of colonialism, many of these coups have been backed by the Russian-funded Wagner Group paramilitary organisation, meaning that these countries have merely accepted a new coloniser instead. The Wagner Group, known in the continent as Africa Corps, are just as guilty as France of ravaging Africa for its resources, with many atrocities to their name, such as murdering entire villages in the Central African Republic to advance their own interests in mining sector. This begs the question; is there even any hope for these pillaged nations? Could foreign influence ever potentially assist them?

## China

The modern-day relationship between China and Africa is rather complex. China has been recently lending out large loans to several African nations to aid infrastructure development and economic growth. This may sound like a good deed, but many accuse China of debt-trap diplomacy since these loans are given to risky borrowers with high interest rates, hence allowing them to obtain political or economic concessions when the borrowing nation cannot pay it back. Although Chinese debt still contributes significantly to the continent's US\$1.8 trillion of debt, with 72% of Kenya's bilateral debt being Chinese, an investigation by The Economist concluded that China in fact does not hand out predatory loans, with these accusations often coming from Western nations trying to bolster their own economic interests in the continent with no true care for the people negatively impacted.



Ultimately, the mineral-rich continent of Africa has yet again been rendered a battleground for richer nations who are trying to advance their own economic and political objectives whilst neglecting hundreds of millions of people. Neocolonialism is not exclusive to Africa, with many of the mentioned practices also being conducted across the entire world, even as far as the remote Pacific islands, by several other nations. Next time you wonder how life would've been in the colonial era, remember that you are still living in it right now. Will you choose to accept this state of affairs?

# Past to Present

by Minyoung Modak- Chowdhury

I never really had the luxury of a guaranteed meal everyday as a child. My father would always be out working any job that he could, trying his best to provide for his wife and child. I never understood at that age why he was rarely ever around, and my mother would always respond with a vague "Papa is out working." As I grew up, I began to hear snippets of conversations between my parents about not having enough money and bitter talking of the unaffordable luxuries.

I used to try to comfort my mother as she wept on the days when we faced the worst and ran around trying to earn even a little money to try support us. The older I got the more the pressure began to build up. The constant fear of not having enough to survive and the fear that I would forever live like this in the future. I was already lucky enough to be able to read and write but my luck would soon enough run out. But when things started to look bad, a miracle came my way. It was on a Saturday that things got a bit better for me. My mother had received the news that my uncle had gotten a job in one of the western countries and had offered to take me to get educated in a school there. My mother urged me to take this opportunity and my father simply nodded his approval.

And so, I travelled with my uncle and got into a decent school and marvelled at how different it all seemed from home. I was nervous and intimidated by all the other students and how smart they seemed compared to me. Science was the subject I particularly struggled on, unable to grasp what was happening in all the lessons. I continued to pass through every lesson feeling alone and struggling. I knew I would never be as good as the other students who had probably gotten tuition and had more opportunities than me and began to start slacking off. I didn't bother and felt pessimistic until I found one subject that I truly felt like I did well in. History.

History fascinated me and I would enjoy the classes very much. I studied hard in my free time and soon became top in History. My history teacher, Mr Smith, of course noticed this and congratulated me and told me to keep it up. However, seeing all the good grades I got, I began to slack off again thinking I had done enough for now. And so the routine continued. I pushed every deadline and time to study until the very last minute and my grades began to drop down.

laughed and cracked jokes in class until one day, Mr Smith pulled me aside after a class. "Let me get straight to the point right now." ,he said sternly. "I've noticed how your behaviour and grade has been getting increasingly worse. Again. I know you have a passion for history and want to continue but this won't happen if your attitude is like this. And let me tell you one thing about history. It always repeats itself. No matter what happened, it always has. For example, throughout history, countries have always been declaring independence from others or having a revolt. Even today some still want independence. Another example is war. War has always occurred from a past injustice or rivalry and also still occurs to this day. If you don't change your attitude, you will always get bad grades and bad results even when you are older. The past will always affect the future. For this reason, you must try your best in the present for one day, this will also be the past."

I learned my lesson after the talk with Mr Smith and soon began to mend my ways again and began to see my grades going up again. Not a significant difference but a sign of progress. Surely enough, the past did affect present and now I look bad and wish someone had said the words of Mr Smith sooner so I could have spent more time on my studies. But nevertheless, at the end of my time at the school, I passed the exams with astounding grades and History was the one I did best it.

With my good grades, I grew to be able to help not just my parents, but others in my home country. I travelled across the globe visiting different countries talking to different people and charities raising money for those who would be able to do something great if given the chance I had received as a child.

My past affected who I grew to up to be in the present. The past of every country plays a role in their current state. Some are lucky while others are not. Some still heavily rely on others bound to their past while others grab the first opportunity that swings their way. The past will always affect the present.

# How do Past Epidemics affect reactions to modern ones?

By Josh Sohal

While the COVID-19 Pandemic may be the only major pandemic many of us will experience in our lifetime, pandemics have been recurring throughout history, with the earliest recorded one being in 430 BC Athens. By studying the lessons learnt from past pandemics such as the Spanish flu, the Black Death, or the more recent Ebola and SARS outbreaks, governments have been able to structure more effective responses to pandemics in the hopes of preventing spread and treating them efficiently.



One of the most significant ways past epidemics influence reactions to current ones is through the lessons learnt. Previous outbreaks have taught us about the importance of early detection, rapid response, and robust public health measures. For instance, the devastating impact of the 1918 influenza pandemic spurred advancements in epidemiology and vaccine development, laying the groundwork for future infectious disease control efforts. In the COVID-19 pandemic, most state and local governments imposed restrictions on public activity, restricting movement and closing public institutions. Similarly, many cities during the Spanish flu pandemic adopted protective measures such as the closing of schools, churches, and large gatherings, clearly exhibits how government institutions use historical reactions to guide their own. More recently was the SARS epidemic which prompted improvements in global surveillance systems and emergency response mechanisms.

Epidemics also help develop the efficiency of international cooperation once they spread out of a particular region. The swine flu pandemic fostered greater international collaboration in sharing data, resources, and expertise to combat infectious diseases. Various countries like Brazil, US, Canada, India, and other EU states worked together through platforms such as the World Health Organization (WHO) to coordinate response efforts, share the best practices, and support affected regions with medical supplies and personnel. The best medical professionals don't all reside in a single state- they are spread throughout the globe and the most efficient in eradicate a virus is through these top professionals combining their vast knowledge and skills. The global campaign to eradicate smallpox in the 20th century was one of the most successful examples of international cooperation in public health. Led by the WHO, the smallpox eradication program mobilised resources and expertise from different countries. Through coordinated vaccination campaigns, surveillance efforts, and containment strategies, smallpox was successfully eradicated in 1980. This marked a historic achievement in global health, showcasing how vital corporation is.

Now while it is easy to focus on the reaction of health organisations, epidemics have and have always had an immense psychological impact on individuals. Now while many of us may have initially celebrated the COVID-19 pandemic for closing the schools and offices that we all dread going to on a Monday morning, it was certainly the older generations where most of the hysteria lied, and this wasn't only due to them being more vulnerable. A large part of the initial hysteria lied with them due to their memories and experience of previous pandemics, leaving them permanently scarred.

As Santayana rightly stated, "Those who cannot remember the past are condemned to repeat it". Therefore it is our responsibility to reflect on the past in-order to effectively respond to future catastrophes to limit the loss of life.



# The Legacy of British Colonialism on Beauty Standards in South and East Asia

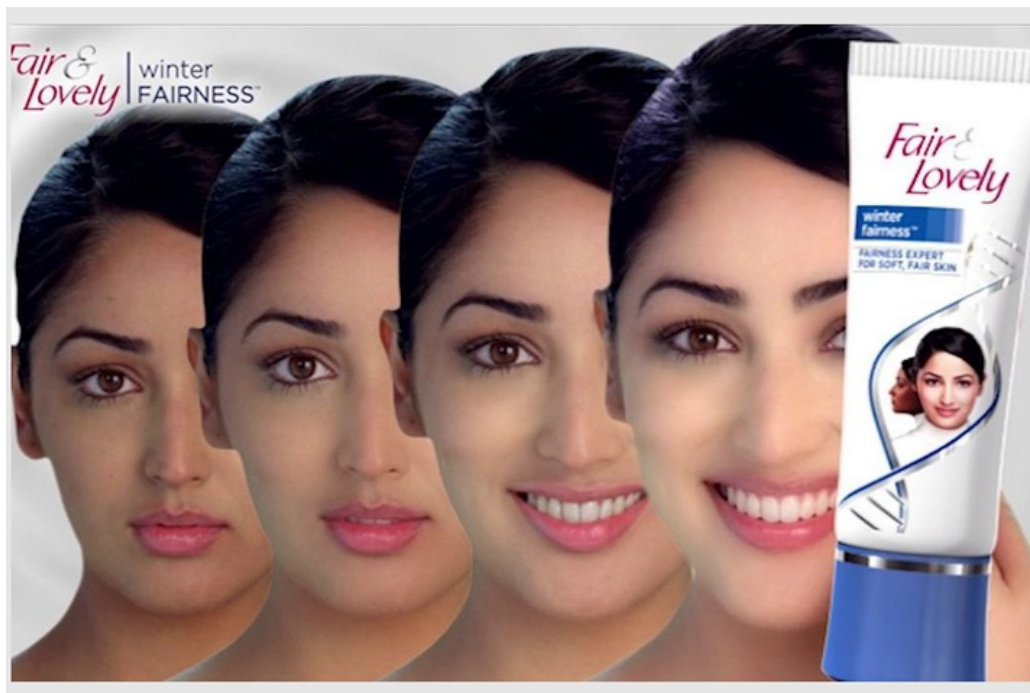
By Priyanka Lama

The impact of British colonialism on the societies it touched is hardly forgettable. One area where its influence remains palpable is in the realm of beauty standards. Nowhere is this more apparent than in South and East Asia, where colonial legacies continue to shape perceptions of beauty, serving as a reminder of the lasting consequences of imperialism. Despite gaining independence decades ago, many countries in the region still grapple with the legacy of colonialism, including its influence on perceptions of beauty.

During their rule, the British imposed their own standards of beauty upon the regions they colonised. Fair skin, often associated with British aristocracy was valorised, while darker skin tones were belittled. This bias towards fair skin persisted long after the colonial rule ended, leading to widespread use of skin-lightening products and a societal preference for lighter complexions.

In countries like India, the legacy of British colonialism is evident in the prevalence of fair skin as a symbol of beauty and privilege. Advertisements for skin-lightening creams dominate the media, furthering the notion that lighter skin equates to success and desirability. This obsession with fair skin has deep-seated roots in colonialism, where British rulers propagated the idea that whiteness was superior to other skin tones. According to market research, the global skin-lightening market was valued at over \$8 billion in 2019, with Asia-Pacific countries, including South and East Asian nations, accounting for a significant portion of this market. India has one of the largest markets for skin-lightening products, with millions of consumers purchasing such products annually.

Similarly, in Southeast Asian countries like Malaysia and Singapore, where British influence was pervasive, beauty standards continue to reflect colonial ideals. Lighter skin is prized and individuals with darker complexions often face discrimination and prejudice in various circumstances whether in the workplace or in developing relationships. Surveys and studies have documented the prevalence of colourism and social discrimination based on skin colour in these societies. For instance, research conducted in Malaysia showed that individuals with lighter skin tones were more likely to receive higher salaries and better job opportunities compared to those with darker skin. However, this bias extends beyond skin tone to encompass features such as straight hair and Eurocentric facial features, which are often considered more attractive in societies influenced by colonialism.



The impact of British colonialism on beauty standards in South and East Asia manifests in modern-day life through psychological, economic, and social channels. Individuals internalise Eurocentric ideals of beauty, leading to low self-esteem and body image issues. The beauty industry thrives in promoting products that promise to conform to Western standards, perpetuating consumerisms, and economic disparities. Data from social media platforms and e-commerce websites indicate a significant demand for skin-lightening products and cosmetic procedures in South and East Asia. Beauty influencers and celebrities with lighter skin tones often have larger followings and higher engagement rates, reflecting the influence of Eurocentric beauty standards on online beauty trends. Additionally, studies have shown that lighter-skinned individuals are disproportionately represented in media, including advertising, television, and film, in many Asian-Pacific countries. For example, in the Bollywood industry, lighter-skinned actors and actresses are often favoured over those with darker complexions. This bias towards fair skin is evident in casting decisions, where actors with fairer skin are more likely to be cast in leading roles and receive greater recognition and success whereas those of darker skin tones are typically type casted into the roles of the villain. Research in India also showed that over 70% of advertisements for beauty products featured actors with fair skin.

Addressing these ingrained biases requires a concerted effort to challenge Eurocentric beauty standards and embrace the diverse array of skin tones and features that exist within these societies. Discrimination based on skin colour and physical appearance persists, exacerbating social inequalities. Moreover, cultural identity is eroded as indigenous beauty practices are overshadowed by Western ideal.

Moving forward, it is imperative to recognise the harm caused by colonialism and work towards creating more inclusive beauty standards that celebrate the beauty of all individuals, regardless of their skin colour or physical attributes. By acknowledging and confronting the legacy of colonialism, we can begin to dismantle its influence and foster a society where beauty is defined by diversity rather than conformity to outdated and discriminatory standards.

The legacy of British colonialism has prompted a re-evaluation of beauty standards, leading to a greater appreciation for diverse appearances and cultural backgrounds, with a growing movement of activism and resistance aimed at challenging colonial beauty norms and promoting inclusivity.

A broader range of skin tones, facial features, and body types, challenging the narrow Eurocentric ideals imposed during colonial rule are now celebrated with a resurgence of pride in indigenous beauty practices and traditional aesthetics. Communities are reclaiming their heritage by promoting and preserving local beauty rituals, hairstyles, and adornments, bringing about a sense of cultural identity and empowerment.

With the progressively increasing representation in media, particularly in South and East Asia, there has been a notable shift towards challenging entrenched beauty norms rooted in colonial legacies. The broader inclusion of diverse faces and bodies in various media forms marks a significant step towards dismantling stereotypes and promoting a more inclusive definition of beauty. Media platforms are actively challenging the narrow Eurocentric ideals that have long dominated beauty standards through their showcasing of a range of skin tones, facial features, and body types. This move towards diversity not only reflects the richness of modern society but also fosters a culture of acceptance and celebration of individual differences. As these representations continue to evolve, they play a crucial role in reshaping societal perceptions and promoting greater inclusivity in beauty standards.



# Pokémon Through the Ages

By Sandeep Kota

As you can see the past of Pokémon has deeply embedded into the newest Pokémon Series as the new protagonist Roy and Liko have significant traits like the champion of the world coronation series Ash Ketchum.

The first and most obvious thing that we can see is that Liko is constantly harassed and tormented by the Explores like Ash has been constantly harassed for 25 years by Team rocket. However, the difference is that in Ash's case it is his overpowered Pikachu which interested Team rocket as its electricity was powerful, but in Liko's case it is her mysterious and powerful pendant which when she used it the first time a strange green hexagonal force field presented herself around her.

Secondly, like Ash's pikachu, there is a pikachu on the Rising Volt Tacklers ship called the captain as its most often seen at the seat to the steering wheel to navigate even though Friede is the head of the Rising Volt Tacklers. The Pikachu that Ash has is overpowered just because his battling style is so amazing and unique. Similarly, Captain Pikachu's battling style is just as unique with its double team tactic and appearing out of nowhere and he used it same battling style to train Spigatito (Liko's Pokémon) and Fuecoco (Roy's Pokémon).

Roy's personality and his can-do attitude show a resemblance to Ash as his never give up and can -do anything personality and we as watchers are shown this when ash is in Kalos, and he is in a gym battle with the grass type gym and his determination after he lost is evident as he is seen training all night for his rematch and he won. This is similar with Roy as when he is trying to rally the Pokémon to fix the airship.

Lastly, Liko's Spigatito was disobedient at first and scratched Liko's palm before running away, causing her to ditch class to find it. Similarly, Pikachu was the most disobedient Pokémon ever as it did not listen to Ash and did its own thing just like Sprigatito. It took the encouragement and support of the Pokémon's trainers to give the Pokémon the push they needed to become better.

The past really influences the present as we all can see...

# “But Sir, Einstein said Time is Relative!”

By Christopher Zander

Just about every physics student is familiar with the phrase “time is relative”, and has no doubt wanted to use it as an excuse for being late to lesson. Even those outside the physics classroom are likely to have at least heard of this idea, but where does it come from, and what does it actually mean?

It all begins with special relativity.

Imagine you are on a train, and your friend stands by the tracks. Your train is fast, faster than a rocket, almost as fast as light itself. Two bolts of lightning strike two trees either side of you, equidistant from both you and your friend – your friend, who is standing still, sees the two of them strike the trees at the same time. What do you see?

This is one of the questions at the heart of special relativity. Since light has a fixed velocity, you will see the lightning bolt that struck in front of you first, and the bolt behind you second, as one bolt must catch up to you, and the other is intercepting you. This makes intuitive sense, and it proves that there is no such thing as universal simultaneity.

Since the relative speed of light must be constant – a principle required to satisfy Maxwell’s equations from some years earlier – how can the relative speed of the light remain the same, yet the same thing happen at a different time? Einstein suggested that the only way for this to be possible is for time itself to move at different rates depending on how fast you are moving.

It is easy to brush past this revelation – it does not seem like much, derived from such a simple thought experiment – but we must not ignore the incredible significance of this discovery. There is no universal heartbeat to the universe, no clock that can track time everywhere in space; it is all relative.

A natural further point of enquiry would be to ask why this principle does not seem to affect our daily lives. Our clocks don’t seem to slow down when we drive on the motorway - if anything, our passengers affect the flow of time more than the precise speed we drive at - so how exactly does special relativity affect us?

The answer is tucked away in the name of the theory – special relativity mainly influences special cases, which are very high speeds and energies. At the local scale of running to the supermarket or getting to lesson on time, its effects are negligible (sorry, physicists).

However, this article is not just an exercise in the abstract – it turns out that relativity and time dilation actually do affect our daily lives, and it has to do with GPS.

In order to understand this, we must once again delve into one of Einstein’s thought experiments – the light clock.



In a brief summary, if we set up a beam of light to be bouncing between two horizontal mirrors, if I move at the same speed in the same direction as the set-up, the light will appear to bounce up and down in a vertical line. If I move at a different speed, the light will seem to make a triangular or zigzag shape as the set-up moves away. This allows us to use geometry and basic physics to create an equation that we can use to calculate the magnitude of the time dilation effect.

Essentially, we have a formula for the difference in time taken (the reader is invited to further research this, and maybe even try and derive this formula - further analysis of the equation will clarify why the relativistic effects are only notable at high velocities).

Linking this back to GPS, a GPS satellite is what is called a “geostationary” satellite. This means that it orbits the Earth at just the right height and speed for it to always stay directly above the same point on Earth’s surface. For this to happen, it must be moving quicker than the surface of the Earth, as it covers a larger distance in the same time.

GPS works by sending a signal to Earth, and timing how long it takes for the signal to return – since the speed of light is constant, we can use this time to calculate the distance the signal must have travelled. Using the formula Einstein created for the time difference due to special relativity, it was suggested that GPS satellites would need deduct time from their clocks in order to account for time dilation. Measuring time is a serious issue - without an accurate way of measuring time, there is no way to accurately determine distance at that scale, and even small variances can result in distance measurements several kilometres off.

It was calculated that seven microseconds (0.000007 seconds) would have to be deducted from the satellite clocks on a daily basis, or the system would quickly become inaccurate, and that a further 45 microseconds would need to be added (this is due to general relativity and gravity, not the focus here). What we found, programming the satellites to do this, was that they worked perfectly. To this day, GPS remains a brilliantly accurate and reliable technology, helping everyone find where they are to within around 3 meters.

So the next time you turn on the TomTom satnav, or sit in detention for talking back to a teacher, just remember; it’s all thanks to some strange, revolutionary, and delightfully complicated theory, that has changed the landscape of physics and our understanding of the Universe to this very day.

# Behind Those Lurking Eyes

By Tanisha Shah

Look once look twice but look thrice and you know something is amiss.

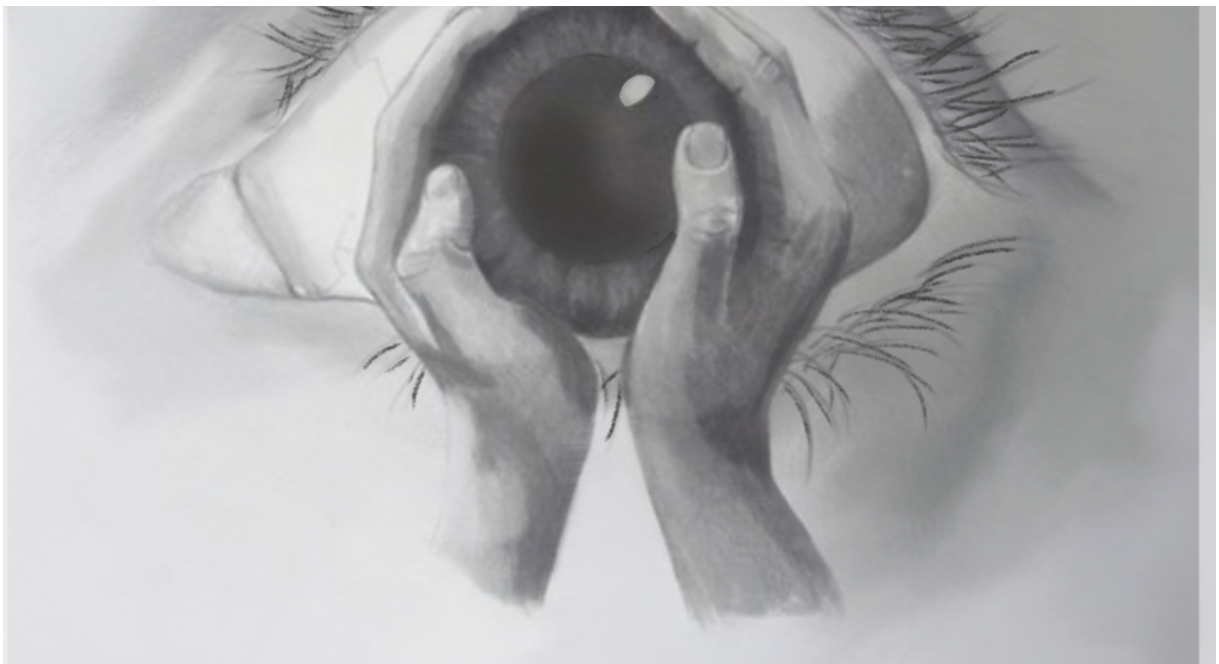
My pupils shift to the corner of my eyes with my head stiff in its place, unwilling to unhide and expose the truth behind my lurking eyes.

They rapidly return to their residing positions immediately so, my heart beats a little faster and my breaths go a little deeper, as if my soul is slowly straying away from the vessel of a human body my soul calls home.

My brown and softly beaded pupils switch back and forth charging me guilty of breaking an oath of promise where I intended never to look back.

But how can I ever afford to uphold such a pledge? I'm only a soul after all waiting to be heard, waiting for this human body to hear me speak, waiting for this vessel to understand who we truly are.  
I am her and she is me.

For I'm her past guiding her body in the present to await her future.  
If only she looked back, she would know she had an eye on her after all.



Drawing by Nidhi Pandit