



The Academic Scholars' Journal of
South Hampstead High School

ISSUE 7 | *Harmony*

PILOT LIGHT

HARMONY

This year's academic theme has been 'Harmony', emphasising the importance of collaboration between individuals and disciplines. Writing for the Pilot Light, our Lower School Scholars have embraced this theme, tackling big ideas – such as the role of the Moon in society and ecosystems, or the inspiration urban design can take from biology – with aplomb. I certainly felt my horizons broadened by these articles, and I hope you do too!



CHIARA, UPPER SIXTH

Deputy Head Girl - Academic & Scholarship

Contents

6

Synaesthesia: How Harmonies Can Provoke Art

AIYLA, YEAR 8

MENTORED BY TILLY N, YEAR 10

8

The Harmony Between Satellite Constellations and Astronomy

AMELIE B, YEAR 10

MENTORED BY SOFIA, LOWER SIXTH

9

How Are Ecosystems and Families Adapted to Live in Harmony?

AMELIE W, YEAR 9

MENTORED BY EVIE, YEAR 11

11

Biomimicry: Harmony Through Design

ANA, YEAR 7

MENTORED BY KIKI, YEAR 9

12

What Is Harmony Between Humans and Nature?

ANASTASIA, YEAR 8

MENTORED BY ROSE, YEAR 10

14

Wa in Japanese Culture

ANOUSHKA, YEAR 7

MENTORED BY HONOR, YEAR 9

15

Harmony in the Afterlife and Religious Beliefs About Heaven

CHARLOTTE, YEAR 10

MENTORED BY LILIA, LOWER SIXTH

16

What Is World Harmony and How Can We Achieve It?

CLEO, YEAR 7

MENTORED BY JESSICA, YEAR 9

18

Scientology: The Way to a Harmonious Lifestyle or a Cult?

DIYA, YEAR 9

MENTORED BY DASHA, YEAR 11

19

The Symbiosis of Sharks and Remoras

ELSIE, YEAR 7

MENTORED BY KAYA, YEAR 9

20

The Harmony of Whales

HONOR, YEAR 9

MENTORED BY IRIS, YEAR 11

22

Synthetic Inertia: Preserving Harmony in the Energy Grid

JESSICA, YEAR 9

MENTORED BY COCO, YEAR 11

24

The Pros and Cons of Societies Living in Harmony

KAYA, YEAR 9

MENTORED BY ULA, YEAR 11

26

Harmony Between the Moon and Life on Earth

KIKI, YEAR 9

MENTORED BY MARINA, YEAR 11

28

Do Symmetry and Perceived Beauty Work in Harmony with Each Other?

KITTY, YEAR 8

MENTORED BY CHARLOTTE, YEAR 10

30

A World in Harmony

LEIGH, YEAR 8

MENTORED BY DIYA, YEAR 9

31

Could Honeybees Hold the Secret to Harmony in the Human Race?

MARINA, YEAR 8

MENTORED BY AMELIE, YEAR 10

33

The Great Pacific Garbage Patch Cleanup

OLIVIA, YEAR 7

MENTORED BY AMELIE, YEAR 9

34

How Does Geography Shape Culture and Make or Defeat Harmony Among People and Nations?

ROSE, YEAR 10

MENTORED BY TILLY M, LOWER SIXTH

36

The Harmony of the Spheres - Can Planets Make Music?

TILLY, YEAR 10

MENTORED BY ANNA & JULIA, YEAR 11

Synaesthesia: How Harmonies Can Provoke Art

AIYLA, YEAR 8
MENTORED BY TILLY N, YEAR 10

I'm sure that when listening to a piece of music, or hearing a particular person's voice, colours and shapes don't spring to the mind's eye. However, to around 4% of the population, stimulating one sense will automatically trigger another. This is synaesthesia – a neurological phenomenon where the unique wiring of the brain results in “mixed senses”. Usually, everyone experiences things the same way. Most people will look at a red shape and perceive that it is the colour red. But to those with synaesthesia, they may also hear a musical note that they have associated with the colour red. In this case, the colour red is the inducer that allows them to experience the concurrent (in this example, the musical note). In short, synaesthesia is when people have a different perception to the usual one.

Many musical composers have had synaesthesia, including Alexander Scriabin and Franz Liszt, and as a result, many of their pieces are described as more visual and evocative. Olivier Messiaen was probably the most famous composer who had chord-colour synaesthesia. Whilst others called him absurd and mad, he described how each chord and each separate harmony created a colourful image in his mind. To Messiaen, and also to many others, his work depicted bright colours. Messiaen also tried to incorporate birdsong into his music, saying that when he created birdsong through instruments, he could see the colours of the birds in his mind. As a result, Messiaen's music evoked bright images, even to others, which soon became a defining characteristic of his work.

Another artist who is said to have been a synaesthete is Vincent Van Gogh, the famous Dutch artist from the 1800s. Van Gogh started taking piano lessons but soon stopped, because his teacher labelled him a 'madman' when he described seeing colours every time a note was played. Van Gogh painted many of his most famous pieces of artworks in blue and yellow, such as 'The Starry Night' and 'Sunflowers'. It is widely believed that he used these colours because they triggered a synaesthetic response of joy and hope for him. Van Gogh himself once said that blue and yellow were “like fireworks for his senses” and using contrasting colours helped reflect his turbulent state of mind. His artwork also seems to elicit hope and joy in the viewer's mind.

Messiaen, Van Gogh and many other artists have used their synaesthetic abilities to visualise harmonies within their work to create pieces of art. If you are not a synaesthete, this ability may seem impossible. However, what if I were to tell you that you once experienced synaesthesia yourself? Studies show that when babies are born, they show many signs of potential synaesthesia, suggesting that everyone is indeed born with 'mixed senses'. Because babies have an abundance of neural connections, this can lead to cross-sensory experiences, a symptom of synaesthesia. However, as the baby develops, using these connections becomes less frequent, as they aren't used in day-to-day life, and they eventually stop altogether. But what if these connections were encouraged?

Studies show that there are indeed ways to encourage the neural connections needed to trigger synaesthetic responses. If you were to associate a colour with a letter every time you see it, you may start to have synaesthetic responses to that letter. Although these people may not be considered 'true synaesthetes', it shows that

it is possible for everyone in the world to have synaesthesia. Composers and artists with synaesthesia are excellent examples of how the world can become visually brighter through music. Synaesthetes are only a fraction of the population, but imagine if everyone had synaesthesia. Would we all be able to see harmonies?

Bibliography

- BBC. "BBC Radio 3 - Catalogue d'Oiseaux, Dawn Chorus - the Composer Who Took a Cue from Birdsong," n.d. <https://www.bbc.co.uk/programmes/articles/3gJFSH6W6wXVgybrqNtFGq/the-composer-who-took-a-cue-from-birdsong>.
- Classical-music.com. "Five Composers with Synaesthesia," 2023. <https://www.classical-music.com/features/composers/5-composers-synesthesia>.
- Cleveland Clinic. "Synesthesia." Cleveland Clinic, Cleveland Clinic, May 3, 2023. <https://my.clevelandclinic.org/health/symptoms/24995-synesthesia>.
- Deroy, Ophelia, and Charles Spence. "Are We All Born Synaesthetic? Examining the Neonatal Synaesthesia Hypothesis." *Neuroscience & Biobehavioral Reviews* 37, no. 7 (August 2013): 1240–53. <https://doi.org/10.1016/j.neubiorev.2013.04.001>.
- <https://www.facebook.com/BBCReel>. "Why Reality Is Different for Each of Us." BBC Reel, 2023.
- Nelson, Angela. "What Is Synesthesia?" WebMD. WebMD, February 26, 2018. <https://www.webmd.com/brain/what-is-synesthesia>.
- Ravindran, Shruti. "Are We All Born with a Talent for Synaesthesia?" Aeon Essays. Aeon Magazine, January 20, 2015. <https://aeon.co/essays/are-we-all-born-with-a-talent-for-synaesthesia>.
- Razo, Mayra. "Hallucinations or Chromesthesia?" NBB in Paris, June 10, 2019. <https://scholarblogs.emory.edu/nbbparis/2019/06/10/hallucinations-or-chromesthesia>
- "Synaesthesia: The Phenomenal Power of Human Perception". BBC Reel, <https://www.bbc.com/reel/video/p0cvrn0x/synaesthesia-the-phenomenal-power-of-human-perception>. Accessed 10 Feb. 2026.
- The Art Story. "Synesthesia - Modern Art Terms and Concepts," n.d. <https://www.theartstory.org/definition/synesthesia/>.
- The Synesthesia Tree. "TYPES of SYNESTHESIA in ALPHABETICAL ORDER," September 6, 2025. <https://www.thesynesthesiatree.com/2021/02/types-of-synaesthesia-in-alphabetical.html>.

The Harmony Between Satellite Constellations and Astronomy

AMELIE B, YEAR 10

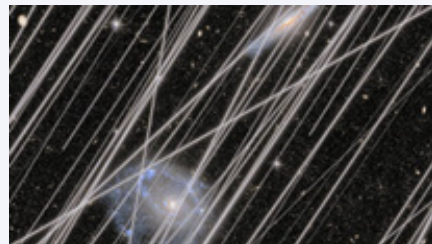
MENTORED BY SOFIA, LOWER SIXTH

As our world becomes increasingly digital, we're putting more and more things into space and mostly ignoring the consequences. Constellations of thousands of satellites are generally used to provide high-speed internet but, alongside other issues, they can block our view of space. As we fill the sky with satellites, we have to ask: what are we actually gaining and can this new technology find harmony with what we already have?

While satellite constellations are mostly associated with faster WiFi, they can also help bring the internet to parts of the world beyond the reach of current telecommunication infrastructures. The internet mostly works by connecting to the nearest cell tower until there are none close enough to connect to. This sounds reliable enough, but in a crisis, it almost never is. If there is a fire, earthquake, bombing, or any other kind of disaster, all the cell towers in the affected area will likely break. Alright, so they don't have the internet while their houses burn down. Is that really a problem? Actually, it is. Emergency services that go into disaster zones need to know where the disasters are and make sure that the whole team is safe. With the internet, people affected by the crisis can also receive instructions from emergency services and communicate with loved ones. Since satellite constellations are in Low Earth Orbit but can't be affected by these disasters, a small portable kit can provide incredibly high-speed internet access. Even if it's only for good publicity, companies making these constellations are helping. Starlink, Elon Musk's satellite company, provided free emergency kits to people in the LA and Maui wildfires and the earthquakes in Ecuador and

Vanuatu, and gave people affected a month of free internet. This helped people to stay connected when they otherwise couldn't.

The problem is that we're putting thousands of objects into space. To provide high-speed connection, the satellites orbit relatively close to the ground. This means that to cover the whole planet, we need a lot of them, hence the name 'constellation'. They are made from solar panels and other bright materials that reflect sunlight, so when optical telescopes take images of space, they come out full of streaks of light from satellites going past in the time taken to capture an image. Satellites also emit signals to transmit data back to Earth, so when radio telescopes try to detect radio signals, they pick up a lot of interference. These telescopes help us to understand not only our universe but also our planet's climate and asteroids coming near us, so a clear view is essential. This problem will only get worse – right now, there are around 11,000 satellites in space. By 2030, that number is estimated to be over 100,000. Some pessimistic astronomers even think that, by that time, the only visible constellations will be man-made.



Many bodies are investigating ways to regulate these risks. We could use a special black paint on the satellites, limit their numbers, or face them away from Earth. However, when thinking about more impactful solutions, we have to make some trade-offs. We can't have both full satellite constellations and full telescope visibility, so what will we prioritise? Astronomy got there first, but who is it really helping? Most astronomers would tell you

that it's not just about looking at the pretty stars from the ground; there is an important application, but we're just a few decades away from finding out what it is. So, for now, it's quite theoretical. Satellites, however, are making a huge difference. Yes, they're blocking the stars from view and disturbing nature even beyond Earth, but if all living things live here anyway, why shouldn't we fill space with robots if they can save lives?

Bibliography

- "About Satellite Constellations - CPS." 2024. [iau.org. 2024. https://cps.iau.org/resources/100-hours-under-one-sky-about-satellite-constellations/](https://cps.iau.org/resources/100-hours-under-one-sky-about-satellite-constellations/).
- Borlaff, Alejandro S, Pamela M Marcum, and Steve B Howell. 2025. "Satellite Megaconstellations Will Threaten Space-Based Astronomy." *Nature* 648 (8092): 51–57. <https://doi.org/10.1038/s41586-025-09759-5>.
- Press, Larry. 2026. "Starlink's Role in Last Year's Los Angeles Fires." *Circleid.com*. 2026. <https://circleid.com/posts/starlinks-role-in-last-years-los-angeles-fires>.
- Rannard, Georgina. 2024. "Elon Musk's Starlink Satellites 'Blocking' View of the Universe." *Bbc.com*. *BBC News*. September 18, 2024. <https://www.bbc.com/news/articles/cy4dnr8zemgo>.
- Starlink. 2024. "Starlink." *Starlink*. 2024. https://starlink.com/emergency-response?srsiltid=AfmBOorwWssWIO515IJI RZ9XUxs_Wug4TCU2QqbbZQcSRV2iyc2IQN7

How Are Ecosystems and Families Adapted to Live in Harmony?

AMELIE W, YEAR 9

MENTORED BY EVIE, YEAR 11

The Oxford English Dictionary defines an ecosystem as '[t]he set of relationships between living and non-living things in nature, or a specific natural community, including the interactions of climate, soils, rivers, and all forms of animals and plants'. This definition can be linked to social harmony and to the workings of families. Both networks have different roles that need to be fulfilled so they function properly. However, these roles are distributed both similarly and differently in ecosystems and families. Here are some examples that demonstrate this.

Evidence suggests that relationships in ecosystems are foundational to how well an ecosystem can exist. Yellowstone National Park in the United States of America provides a compelling case study. In 1926, the last wolves of Yellowstone National Park were killed by park employees as wolves were "a decided menace to the herds of elk, deer, mountain sheep and antelopes". Government agencies predicted that the absence of predators would ensure a flourishing wildlife, but the reality was vastly different. In the 70 years before wolves were reintroduced, scientists saw a decline in some native species, including grizzly bears, muskrats, salmon, and ravens. At the same time, numbers of herbivores, like deer, increased, as there were fewer predators that hunted them. Eventually, there was land erosion due to overgrazing. This triggered the biggest change to the ecosystem, which was the rivers' geographical form. Riverbanks collapsed and courses of rivers changed

because the absence of wolves had caused a trophic cascade – predators of an ecosystem affect all the trophic levels of the food chain. When wolves were reintroduced in 1995 (under the terms of the Endangered Species Act of 1973), the number of wolves increased, as well as other impacted species. Heights of aspen trees quintupled, and beaver numbers surged as the rivers stabilized. These are just a few examples of the interdependence of wolves and the wider ecosystem, showing the importance of each role in the food web for an ecosystem to function.

Similarly, all family members have different roles. The main four roles that psychologists discuss are the “Caretaker”, the “Provider”, the “Stabiliser” and the “Bridge-Builder”, which are vital elements for families to thrive. Without them, a family becomes dysfunctional, leading to severe impacts on family members. For example, the absence of a “Stabiliser” can cause a toxic, a conflicted homeplace. Typically, multiple people are responsible for fulfilling one role, as it is too much responsibility for one person to take on. However, when a single person tries to fulfil all the responsibilities, problems arise. To demonstrate, a single-parent family without further support usually leaves one person to fulfil all of these roles, leading to the parent subconsciously training their children through classical conditioning. This leads children to adopt something called “Dysfunctional Family Roles” (coping mechanisms in unhealthy situations), which is not the parent’s intent but is the consequence of having stagnant roles. Examples of dysfunctional roles are the “Hero” (overachiever) and the “Parentified Child” (forced to act like a parent). This often causes later problems such as Dissociative Identity Disorder (DID), showing the harm caused by not distributing and occupying roles appropriately.

In conclusion, both ecosystems and families

have key roles that need to be sustained. In Yellowstone, the role of a predator was not being fulfilled and in families, different people are responsible for different things, so the burden does not fall on one person. The difference is that in families, roles are passed between people, but not frequently, as this causes subconscious confusion. In ecosystems, species are unable to adapt to different species fulfilling other roles. Maybe one day, they will adapt to be able to do otherwise. Overall, the main takeaway from this is that both families and ecosystems utilise structured systems and relationships in order to sustain harmony.

Bibliography

- Chavda, Kersi, and Vinyaś Nisarga. 2023. “Single Parenting: Impact on Child’s Development.” *Journal of Indian Association for Child and Adolescent Mental Health* 19 (1): 14–20. <https://doi.org/10.1177/09731342231179017>.
- Greater Yellowstone Coalition. 2024. “A Timeline of the Yellowstone Wolf Reintroduction.” Greater Yellowstone Coalition. 2024. <https://greateryellowstone.org/yellowstone-wolf-reintroduction>.
- National Park Service. 2017. “History of Wolf Management - Yellowstone National Park (U.S. National Park Service).” *Nps.gov*. 2017. <https://www.nps.gov/yell/learn/historyculture/wolf-management.htm>.
- Priebe, Heidi. 2021. “An Introduction to Dysfunctional Family Roles.” *Medium*. November 1, 2021. <https://heidi-c-priebe.medium.com/an-introduction-to-dysfunctional-family-roles-d2b79380c2ac>.
- Sustainable Human. 2014. “How Wolves Change Rivers.” *Video*. YouTube. <https://www.youtube.com/watch?v=ysa5OBhXz-Q>.
- Wikipedia Contributors. 2019. “History of Wolves in Yellowstone.” *Wikipedia*. Wikimedia Foundation, February 7, 2019. https://en.wikipedia.org/wiki/History_of_wolves_in_Yellowstone.

Biomimicry: Harmony Through Design

ANA, YEAR 7

MENTORED BY KIKI, YEAR 9

For 3.8 billion years, nature has been evolving, creating and perfecting designs that enable sustainability and the continuity of life. However, our buildings and urban developments are negatively impacting this balance. Architects and designers are aiming to minimise this disruption, and one of the approaches they are using is biomimicry – essentially the imitation of nature. This is an effective way not only to promote sustainability in our own human designs but potentially to contribute to nature itself. This article will look into what biomimicry is, how it is applied and what it can do to better connect humans with the environment.

Biomimicry is a discipline that takes nature’s structures and processes and uses them as a model to create designs that solve human problems. The idea of seeking inspiration from nature is nothing new. Leonardo da Vinci, best known as an artist, used this idea in his invention of the flying machine, the ornithopter, inspired by birds’ wings – this is one of the earliest and most famous uses of biomimicry. Other well-known examples include Swiss engineer George de Mestral using thistle plants to create Velcro and inventor Lu Ban using the shape and repulsion of lotus leaves to create the first Chinese umbrellas. What is changing, though, is how designers are using biomimicry to promote harmony between buildings and their environment. The following paragraphs will dive deeper into this new way of thinking and its impact.

An excellent example of a building that implements biomimicry in its design is the

30 St Mary Axe, more commonly known as the Gherkin Tower, on the London skyline. It was designed by architect Norman Foster and has been awarded multiple prizes including the prestigious RIBA Stirling Prize in 2004. The inspiration for the design is the Venus’ flower basket sponge, an aquatic organism that faces strong water currents; its curved, cylindrical form and lattice-like exoskeleton help to disperse that stress and reduce the impact of forces acting on it. Taking these two features, the Gherkin Tower’s structure allows a natural system of air and light to pass around it smoothly and reach every floor. This design is so efficient that it requires 50% less energy and 20% less structural steel than a building of similar size, reducing material consumption and carbon emission.



The concept of biomimicry is not limited to buildings and physical structures, however; it is also about understanding the need for harmony and alignment in ecosystems. The High Line, a former railway line in New York City converted into a public, open area with over 300 species of perennials, grasses, shrubs and trees, demonstrates this brilliantly. The paving system of the High Line consists of concrete planks with open joints that allow plants to grow through the spaces,

mimicking wild plants. Beneath these plants are layers of soil that are designed to imitate a natural forest floor, directing excess rain into plant beds – an efficient approach that prevents water waste. The High Line creates an ecological corridor for insects, birds and other wildlife, reducing habitat fragmentation where it could have otherwise been harmful, especially in big cities like New York City.



Both the Gherkin Tower and the High Line are examples that show how biomimicry is not limited to pure aesthetics. The discipline requires an understanding of nature's methods, and, by incorporating this into human ideas, we help both nature and ourselves. If we can cooperate with our surrounding environment, we can expect a positive impact on our planet in the future.

Bibliography

- Alibaba, Halil Zafer and Nkandu, Mwila Isabel. 'Biomimicry as an Alternative Approach to Sustainability'. *Architecture Research*, Vol. 8. (2018), pp. 1-11.
- Benyus, Janine. *Biomimicry: Innovation Inspired by Nature*. New York: Perennial, 2002.
- Pawlyn, Michael. *Biomimicry in Architecture*. London: RIBA Publishing, 2011.
- Sun, Lucinda. 'Biomimicry as an Approach to Sustainable Architecture'. *International Journal of Health Sciences and Research*, Vol. 6 (2024), pp. 87-94.

What Is Harmony Between Humans and Nature?

▼
ANASTASIA, YEAR 8
MENTORED BY ROSE, YEAR 10

Harmony between humans and nature is a holistic, non-anthropocentric approach advocating for a balanced and sustainable co-existence between people and the natural world. Rather than seeing humans as rulers over the environment, it views humanity as part of an interconnected system in which all living and non-living things have value. In today's world, which is impacted by climate change, biodiversity loss and poverty, it is vital to live in harmony with nature to establish a better future for the generations to come. Many indigenous peoples, particularly those residing in ecosystems like the Amazon rainforest and the Arctic, are widely recognised as the groups living in the greatest harmony with nature through a reduced carbon footprint and by giving back to nature.

The Māori are the indigenous Polynesian people of Aotearoa (New Zealand), who arrived in Waka (canoes) from Polynesia over 800 years ago. For the Māori people, harmony with nature is rooted in spiritual and daily practice and beliefs. The Māori recognise themselves as part of nature and believe in a reciprocal relationship where humans have a responsibility to protect and respect the environment. They have many beliefs such as "Tangata whenua" which translates to "people of the land". It signifies a deep relationship with the water, land and air and shows that the Maori view themselves as guardians and not owners of the land. Their worldwide view is expressed through "whakapapa", which is the idea that all things in the universe share a common lineage descending from Papatūānuku (the Earth Mother) and Ranginui (the

Sky Father). Central to their lifestyle is "kaitiakitanga", which is the guardianship and protection of over land, water and ecosystems, ensuring they are preserved for later generations. Extending from the fact that Māori believe in a spiritual connection between humans and the natural world, kaitiakitanga is seen as a sacred duty that reflects this relationship, where humans are considered caretakers rather than owners of the land. Practising kaitiakitanga encourages the use of traditional knowledge and practices to ensure that ecosystems remain balanced and productive.

The Asháninka are one of the largest indigenous groups in the Amazon rainforest, numbering between 30,000 and over 100,000, and residing in the central rainforests of Peru and the Brazilian state of Acre. They believe humans and nature are inseparable and interconnected and that maintaining balance, known as "kametsa asaiki" ("the good life" or "living well"), is an absolute obligation. They see themselves as living relatives of the forest and teach that everything possesses a soul, including plants, animals, rivers, winds and the land itself. They describe the Earth as their "flesh", water as their "blood", and air as the "universal spirit". To them, many elements of nature were once human, meaning the forest is a community of ancestors rather than an object that many others use just for exploitation. This is why the Asháninka people are also known as environmental defenders who help protect the Amazon rainforest in many ways. For instance, they have the Asháninka Ovayerii, which means "warriors" in their language, who act as a self-defence and protection community in the Amazon in Peru. They help defend property from illegal logging, help rebuild villages, and they use technology, such as drones, to monitor their territory for illegal activities and fires.

Across these cultures and many others, there is a similar pattern shared amongst them: nature is not an object that is there to be exploited but rather a living system to which humans belong. The Māori emphasise kinship with the Earth through genealogy and guardianship and the Asháninka view themselves as guardians of the forest and the forest as a spiritual relative.

Bibliography

- Alberro, Heather. 'Conservation science still rests on how animals can benefit humans'. *Northumbria.ac.uk*. June 8, 2022. <https://www.northumbria.ac.uk/about-us/news-events/news/expert-comment-conservation-science-still-rests-on-how-animals-can-benefit-humans/>.
- Britannica Editors. 'Māori culture in the 21st century'. *Britannica.com*. February 6, 2026. <https://www.britannica.com/topic/Maori/Maori-culture-in-the-21st-century>.
- Vasseur, Liette. 'Humanity's future depends on our ability to live in harmony with nature'. *Theconversation.com*. October 10, 2024. <https://theconversation.com/humanitys-future-depends-on-our-ability-to-live-in-harmony-with-nature-233042>.
- Zimmermann, Alexandra. 'UN biodiversity conference: what does living in harmony with nature look like?' *Theconversation.com*. 2022. <https://theconversation.com/un-biodiversity-conference-what-does-living-in-harmony-with-nature-look-like-196228>.

Wa (和) in Japanese Culture

ANUSHKA, YEAR 7
MENTORED BY HONOR, YEAR 9

Harmony comes from the Greek word “harmonia” (ἁρμονία), which means “joint,” and “agreement.” In Japan, there is a very similar concept called “Wa” (和). Wa translates as “harmony” and “peace”. It emphasises teamwork and helping one another.

Last year, my family visited Japan. It was one of my favourite holidays, filled with delicious food and beautiful cherry blossoms. One main trend that I noticed was the politeness of everyone, from the strangers on the train to waiters and shopkeepers. They would make sure that we had everything we wanted, and they were always happy to help. This got me thinking about how much harmony and respect are key parts of life in Japan.

The concept of Wa was introduced to Japan in around A.D. 604, when Prince Shōtoku Taishi's Seventeen-Article Constitution was devised. The articles emphasised valuing harmony and avoiding argument and conflict. However, “Wa” was always a word in the Japanese language. Before this, at around A.D. 200, the word “Wa” was a derogatory term used to describe dwarves and short people. It was often associated with the tribes that were the inhabitants of the Japanese archipelago. Some historians think this was because they observed the Japanese practice of bowing (obeisance) quite often, and so it made them look short. Over time, Japanese citizens realised that this was a very disrespectful term. This led to the nation changing the written character of “Wa” to the one recognised today as “harmony”.

This new character is very similar to the character that translates to “Japan”, symbolising how important harmony is to Japanese culture. The change happened

around the eighth century, just after Prince Shōtoku's reign as the regent of Japan ended. The character for “Wa” is actually a Chinese character, not a Japanese one.

Although the choice to change the meaning of “Wa” was a collective one, the concept of Wa in the Prince's Seventeen Articles had already been devised. The Seventeen-Article Constitution was a document authored by the prince, featuring new laws for Japan. These new laws were mainly to give a fresh start to Japan, as the period before this one (the Yamato period) had involved lots of conflict. The first law in the Constitution called for Wa to be valued.

Wa is still relevant to modern-day life. One example of its use is “Kuuki wo Yomu”, (空気を読む) which translates as “reading the air”. This phrase is very similar to the English phrase “reading the room”. Kuuki wo Yomu is all about understanding the feelings and moods around you without words. An example of someone not doing this is when people play music out loud from their phone on a quiet train or bus. This isn't just bad manners; it is also breaking the concept of Wa by annoying others and causing disharmony.

Another example of Wa being used today is in the Japanese art form of Kintsugi (金継ぎ). “Kintsugi” translates to “The Golden Repair”, and it is the art of mending broken pottery with gold. It symbolises healing, and that mistakes can make us stronger. Kintsugi tells us that after conflict, harmony can be restored, and using gold signifies that we can come back even stronger than before.



A main highlight of going to Japan was attending a tea ceremony. Tea ceremonies are traditional Japanese rituals where the Teishu (tea master) prepares and serves matcha. There are 4 main principles of tea ceremonies, one of them being Wa. They believe that it is important for the host and the guest to maintain a harmonious relationship, and to be able to drink tea in harmony.

In conclusion, Wa shows us the importance of harmony, respect, and understanding others. The principle encourages working together as one. These examples are only three of the many ways Wa has been used in Japanese lifestyle, and perhaps we can apply this concept to ours.

Bibliography

- Acar, Adam. 2020. “Japanese Tea Ceremony Explained - Tea Ceremony Japan Experiences Maikoya.” Mai-Ko.com. October 29, 2020. <https://mai-ko.com/travel/culture-in-japan/tea-ceremony/the-japanese-tea-ceremony-explained/>.
- Lufkin, Bryan. 2020. “How ‘Reading the Air’ Keeps Japan Running.” Bbc.co.uk. BBC. January 30, 2020. <https://www.bbc.co.uk/worklife/article/20200129-what-is-reading-the-air-in-japan>.
- Rose, Hannah. 2018. “Exploring the Japanese Culture of Wa and Harmony.” CulturallyOurs. December 5, 2018. <https://culturallyours.com/2018/12/05/exploring-the-japanese-culture-of-wa-and-harmony/>.
- The Editors of Encyclopaedia Britannica. 2019. “Taishi Shōtoku | Japanese Regent and Author.” In *Encyclopaedia Britannica*. <https://www.britannica.com/biography/Taishi-Shotoku>.
- Traditional Kyoto. 2024. “Kintsugi – Art of Repair | Traditional Kyoto.” Traditional Kyoto, 2024. <https://traditionalkyoto.com/culture/kintsugi/>.

Harmony in the Afterlife and Religious Beliefs About Heaven

CHARLOTTE, YEAR 10
MENTORED BY LILIA, LOWER SIXTH

As children, we are often told about the Christian ideas of ‘heaven’ and ‘hell’. Hell is a place of suffering and eternal damnation for those who sin; however, the idea of heaven can look different for lots of people. A Google search for heaven will give you images of clouds, gates, a blue sky and angels, but is

this truly a biblically accurate representation? Non-Abrahamic religions have quite different views of the afterlife: Hinduism, Sikhism and Buddhism all believe in the Samsara cycle, which is a cycle of death and rebirth that is characterised by your actions in life. But even this cycle has an end, and all three of these religions have an escape from the cycle into another peaceful realm.

The Bible has a few descriptions of heaven. One very important feature is that it is a place where there is no more death, sorrow, crying or pain (Revelation 21:4). Another key thing about heaven is that humans will be able to see God in heaven and be with him. This is very important for Christians, as they are able to have a personal connection with God that they were unable to have in the same way on Earth. However, whilst there are descriptions of what heaven feels like, there are different interpretations of what it looks like. Some believe that it isn't a physical place but rather a spiritual state beyond our world. Other people have said it is simply indescribable, as it is eternal and unlike anything on Earth and therefore describing it is pointless. Whilst opinions on the Christian belief in heaven are varied in the specifics, they all agree on the fact that it is a paradise with no more suffering.

As mentioned earlier, Buddhism is a religion that does not believe in a direct heaven after you die, but rather rebirth as a new human. This cycle is called the Samsara cycle; however, it is not a harmonious and peaceful cycle but one that is characterised by suffering. Fortunately, by living a life that follows the teachings of the Buddha, there are ways to escape this cycle and become enlightened, achieving nirvana. Buddhists will often describe nirvana as a blissful, peaceful and unconditioned state. This contrasts to the samsara cycle, which is a cycle of suffering. Unlike many interpretations of heaven, it is mainly thought to be a spiritual goal and not a physical place. Nirvana also

looks very different for different types of Buddhists. Theravada Buddhists see nirvana as the cessation of suffering when escaping samsara, but Mahayana Buddhists see nirvana as gaining knowledge and then helping others escape from the cycle.

The concept of a heaven is an idea that has been around for at least thousands of years in many different cultures and societies. In Norse mythology, brave warriors who died in battle went to Valhalla. Unlike other heavenly states and places, Valhalla is not very peaceful in the way we might expect, but it is a place where Vikings wanted to go to. They believed that those in Valhalla lived with the god Odin and they drank and feasted daily. They believed that Odin was strengthening them for Doomsday, when they would fight with him against the giants.

In conclusion, there are many different cultural and religious beliefs about a paradise in the afterlife that have developed over time. Some are physical, harmonious places and some are more spiritual states. But they all tend to be thought of as a reward or the end of suffering on Earth.

Bibliography

- Denise. "What Is Nirvana: A Full Analysis." *Ourbuddhismworld.com*, March 31, 2025. <https://www.ourbuddhismworld.com/archives/1927>.
- Encyclopedia Britannica. "Valhalla | Norse Mythology," n.d. <https://www.britannica.com/topic/Valhalla-Norse-mythology>.
- Logos. "Critically Discuss Different Christian Interpretations of What Heaven Is Like. [40]." January 6, 2025. <https://divinityphilosophy.net/2025/01/06/critically-discuss-different-christian-interpretations-of-what-heaven-is-like-40/>.
- Miller, Jessica. "What Is Heaven like according to the Bible?" *Christianity.com*, July 23, 2024. <https://www.christianity.com/wiki/heaven-and-hell/what-is-heaven-like-according-to-the-bible.html>.

What Is World Harmony and How Can We Achieve It?



CLEO, YEAR 7
MENTORED BY JESSICA, YEAR 9

Right now, the world is becoming an unrecognisable place due to climate change and war. Many countries around the world have conflicts with other countries but some of those are fixable if we try. There are multiple ways we can try to do this. We can place more women in roles of power, as it has had positive outcomes in the past, such as in the examples of Cleopatra and the COVID-19 pandemic. We also could also start using some countries' strengths to help weaker countries by listening to each other, being more open minded and working to stop fighting each other.

Why should we do this? We all need to succeed to keep going. In the past, when countries have cooperated it has been beneficial. For example, in World War Two, Great Britain was suffering and in need of help, so America and Britain made an agreement called "Destroyers for Bases." America gave Britain 50 obsolete destroyer ships in exchange for a 99-year rent in the Caribbean to build air and naval bases. This aided Great Britain massively, enabling them to fight, and the United States got land, which was also greatly beneficial for them. This made it a win-win situation for them. We do not know if the allies would still have won the war without this aid from America. This is an example of when countries have helped each other for the greater good. We need to continue doing things like this to even get closer to world harmony.

Another way to work towards world harmony is to have more female leaders in roles of power. During the COVID pandemic, only 19 out of 194 countries were led by female leaders. The difference in the number of

deaths was drastic. The graph below shows a study of three pairs of similar countries during COVID, but one in each pair is led by a female leader and one by a male leader.

Another example is when Cleopatra was the Queen of Egypt. She was Egypt's final monarch, and she ruled it well. Cleopatra was particularly good at communication with her subjects. This prevented Rome from taking over Egypt during her reign. This shows that when women have previously been in roles of power or leadership, the outcome has been positive and more unique compared to the outcomes from male leaders. This has led to a more harmonious environment in parts of the world and in more challenging times.

If we start trying to do these things, we could end the wars and disputes between countries. Countries could work together, and conflict could even be prevented from happening, if we get there. If it happened less, we could start to focus more on the other important global issues like climate change, glaciers melting, and poverty. The result of this could be phenomenal.

In conclusion, world harmony is a big goal that will be hard to reach, but if we take it step by step, we can help each other to achieve it. There are clear benefits in helping each other and if we do not, it will be detrimental to everyone. There are many angles that we can tackle this from, but we just need to try. We could achieve so many things together if we listened to each other, if we placed more women into roles of power, if we all worked together, and if we were more open minded than we are now. It is possible – all we need is each other.

Bibliography

- Bowen, Shannon A. "Finding Strategic Communication & Diverse Leadership in the Ancient World: The Case of Queen Cleopatra VII, the Last Pharaoh of Egypt". *Cogent Arts & Humanities*, edited by Lincoln Geraghty, vol. 3, no. 1, Dec. 2016, p. 1154704. DOI.org (Crossref), <https://doi.org/10.1080/23311983.2016.1154704>.
- "Examples of Female Leadership That Changed History | People ACCIONA." 2021. *Acciona.com*, 2021. <https://people.accionacom/diversity-and-inclusion/women-leadership-examples>.
- Henley, Jon. "Female-Led Countries Handled Coronavirus Better, Study Suggests". *The Guardian*, 18 Aug. 2020. *World News. The Guardian*, <https://www.theguardian.com/world/2020/aug/18/female-led-countries-handled-coronavirus-better-study-jacinda-ardern-angela-merkel>.
- Milestones in the History of U.S. Foreign Relations - Office of the Historian. <https://history.state.gov/milestones/1937-1945/lend-lease>. Accessed 10 Feb. 2026.
- Nations, United. "Global Issues". *United Nations*, <https://www.un.org/en/global-issues>. Accessed 10 Feb. 2026.

Harmonious Lifestyle or a Cult?



DIYA, YEAR 9

MENTORED BY DASHA, YEAR 11

Around 7 billion people adhere to religion, be it Christianity, Hinduism, Islam, Judaism or others. These religions often have a goal, such as reaching heaven, attaining peace, Moksha, or justice. But what about Scientology?

Founded by L. Ron Hubbard in 1954, Scientology believes that life's ultimate goal is to free the human spirit and create a harmonious world to live in. This stemmed from Hubbard's theory of dianetics, a psychiatric practice about which he also wrote a book. However, it was criticised for having little scientific validity, which led to him founding the Church of Scientology to portray it as a religion. Despite this also being regarded with suspicion, the promise of a more harmonious life has attracted many celebrities, with actors such as Tom Cruise and John Travolta identifying as strong Scientologists. This begs the question: can Hubbard's findings truly lead to harmony, or do they make false promises?

The ultimate goal of Scientology is spiritual enlightenment and freedom, with members achieving a state of 'Clear' (harmony with themselves and others around them), then 'Operating Thetan' (a functional soul), and eventually being freed from all of their past traumas ('engrams'). This can be achieved in two ways – by 'processing' or 'training'. Processing involves personal and spiritual counselling to rehabilitate the spirit. This includes a trained auditor who asks structured questions and uses an electronic device to erase negative emotions and bring about a more ethical and harmonious life. The second path is 'training', which involves learning to become an auditor. These two paths claim to lead to a world without insanity, criminality and war, erasing the roots of human conflict using spiritual

technology. However, there is little evidence showing any truth behind these theories.

Since its foundation in 1954, Scientology has faced a lot of criticism, with many disagreeing with how opposition has been treated.

Hubbard introduced the 'Fair Game' policy in 1965, which allowed the organisation to litigate anyone seen as an 'enemy' of the group, leading to journalists and former members being stalked and sued. Scientology is also widely regarded as a pyramid scheme, as people have to pay more to reach higher levels – attaining 'Clear' is estimated to cost a shocking \$128,000. Critics also often comment on the group's cult-like control and abuse. Members are expected to stop all connections with family and friends who are critical of the church, often causing families to split up and disrupting the harmony that members seek. Former members within Scientology's elite organisation (the Sea Organisation) have also reported manipulation, physical abuse, and having to work long hours with little pay, which suggests that Scientology is not a religion, but a scheme used by leading members to gain money and exploit vulnerable people. In 2008, there were thought to be about 10 million members globally; however, it is now estimated that there are only 20,000 dedicated members around the world, showing that more than three-quarters of supporters have stopped believing in this promise of harmony.

In conclusion, Scientology can be seen as both a path to harmony and a means for corrupt leaders to make money out of vulnerable, harmony-seeking individuals, depending on who you ask. Many have claimed that Scientology has uplifted their life, whilst others state that it has ruined it. Over the past few decades, more and more opinions on the topic have been voiced, globalising the religion and its criticisms. Based on its financial exploitation, its lack of scientific validity and the abuse that has been found within the organisation, there is little evidence to show that Scientology does in fact lead to harmony.

Bibliography

- Beyer, Catherine. 2019. "Why Is Scientology so Expensive?" Learn Religions. February 10, 2019. <https://www.learnreligions.com/how-much-does-scientology-cost-95805>.
- Blumner, Robyn E. 2021. "Scientology's Tale of Disgrace." Secularhumanism.org. Free Inquiry. April 2, 2021. <http://secularhumanism.org/2021/04/scientology-s-tale-of-disgrace/>
- Britannica Editors. "L. Ron Hubbard." Encyclopedia Britannica, January 20, 2026. <https://www.britannica.com/biography/L-Ron-Hubbard>.
- Chidester, David. 1995. "Religious Ethics - Scientology: A Religion in South Africa." *Scientology Religion*. October 1995. <https://www.scientologyreligion.org/religious-expertises/scientology-a-religion-in-south-africa/religious-ethics.html>.
- "Grade Chart - First Independent Church of Scientology." First Independent Church of Scientology. April 7, 2021. <https://firstindependentchurchofscientology.org/definitions/grade-chart/>.
- Morfoot, Addie. 2019. "Truth to Power Award: Leah Remini on Leaving and Confronting Scientology." International Documentary Association. November 19, 2019. <https://www.documentary.org/online-feature/truth-power-award-leah-remini-leaving-and-confronting-scientology>.
- "Official Church of Scientology." Official Church of Scientology. 2024. <http://www.scientology.org>.
- Robertson, David G. 2017. "Hermeneutics of Suspicion: Scientology and Conspiracism." In *Handbook of Scientology*, 14:300–318. Brill. https://doi.org/10.1163/9789004330542_013

The Symbiosis of Sharks and Remoras



ELSIE, YEAR 7

MENTORED BY KAYA, YEAR 9

Most of us imagine that sharks are large, ferocious predators prowling around the ocean, eating everything in sight. However, researchers have discovered that they are not always savage and that they do not always eat some specific species of fish (known as remoras) even when they are hungry. This phenomenon is called symbiosis. Symbiosis happens when two different species of animals, sometimes predators and prey, harmoniously live together. Usually, both species will benefit from each other, whereas sometimes one benefits at the expense of the other. This essay will explore if sharks and remoras are the type that benefit from each other or not.

Remora fish, also known as sucker fish, are similar to a hitchhiker, as they take a ride on a

shark's back or belly using a unique and highly specialised oval suction disk on their heads. By doing that, they protect themselves from potential predators while helping the shark by getting rid of potentially irritating parasites. Their closest relatives include mahi-mahi and amberjacks, and neither of them have anything on their head that even faintly resembles the remora's sucker. It is easy to get them confused with pilot fish that have a similar relationship but do not physically attach themselves to the shark. But is the relationship between sharks and remoras mutualism, parasitism or a mixture of both?

A mutualistic relationship is when two different species live together and both benefit from each other's company. In this case of sharks and remoras, the remora gets rid of any potentially irritating or harmful parasites from the shark, and in return, the shark gives the remora free food, free travel around the ocean, and furthermore protects it from most of the other predators, such as dolphins, seals and some predatory fish. Remoras also eat any scraps of food floating around the shark, which they also benefit from, as they have less food around them, which leads to less bacteria growth.

A parasitic relationship is when two different species live together but one of them benefits at the expense of the other. The one that benefits is typically a parasite, such as a ringworm, and the one that is being affected badly is the host – a human, for example. Between sharks and remoras, too many remoras can increase the water resistance or drag, making swimming more difficult for the shark. This reduces their amount of agility and sharks would need to spend more energy to get the same amount of food as they would without remoras attached to them. However, the shark would still be giving the same things to the remoras: free rides, food and protection against most predators. Annoyingly for the shark, it is very hard to dislodge a remora: even if they stuck on. When the shark finds or makes a

food source, the remoras will detach and eat before they reattach themselves to the shark. In most scenarios, the remora will stay sucked on a shark until it willingly detaches itself, or until the shark or the remora dies.

To sum up, remoras latching themselves on to sharks ordinarily makes for a mutualistic relationship if the remoras are in small numbers, as the shark will be given a thorough clean, leading to a smaller chance of being irritated by parasites or scraps of food around it. However, if a large group sucks on to the shark then it will increase the water resistance, slowing the shark down and making food harder to catch, resulting in a higher chance of death.

Bibliography

- Jorge Fontes et al., "Hitchhiking to the Abyss," *Ecology and Evolution* 13, no. 5 (May 1, 2023), <https://doi.org/10.1002/ece3.10126>.
- Noble S Proctor and Patrick J Lynch, *Coastal Habitats, Seabirds, Marine Mammals, Fish, & Other Wildlife* (Yale University Press, 2011), <https://doi.org/10.2307/j.ctt5vkx08>
- "Nature Ramblings: Hitch-Hikers," *The Science News-Letter*, February 3, 1951, <https://doi.org/10.2307/3928530>.
- Raymond S. Keyes, "Sharks: An Unusual Example of Cleaning Symbiosis," *Copeia* 1982, no. 1 (February 23, 1982): 225, <https://doi.org/10.2307/1444305>.
- "Symbiosis," BBC Bitesize, n.d., <https://www.bbc.co.uk/bitesize/guides/zp9887h/revision/1>.
- Available at: <https://www.darpa.mil/research/programs/revolutionizing-prosthetics> [Accessed 6 Feb. 2025]

The Harmony of Whales



HONOR, YEAR 9

MENTORED BY IRIS, YEAR 11

Baleen whales are a group of large whales that feed not by chewing with teeth but by filtering tiny animals from the water. They do this using special comb-like structures in their mouths called baleen plates. Common baleen whale species include the blue, humpback, grey and right whales. Baleen whales are generally very large. They migrate long distances between feeding and breeding areas and, despite their size, they are generally considered to be the gentle giants of the oceans. Whales live in harmony with the ocean and depend on their environment and each other to survive.

What makes baleen whales unique is how they use their vocal cords. They have a unique larynx or voice box that is U-shaped in structure and cushioned with fat and muscle. When air passes through it, the cushion vibrates, which enables them to sing and communicate using sound underwater but without choking or drowning. Their ability to communicate across huge distances creates a natural harmony in the ocean with groups of whales kept connected even when they are far apart.



The sounds baleen whales make are of low frequency, meaning that they travel further through seawater, as they are less easily absorbed than high frequency sounds. Some

species, specifically blue whales, can create infrasonic sound that is inaudible to the human ear but is able to travel hundreds of miles across oceans. Whale songs work together like music and are essential for the species' survival. Scientists have established that whales use their distinct vocalisations to find mates and for social interaction. It's how mothers maintain contact with their calves. It's also essential to avoid predators. Some baleen whales use acoustic crypsis to avoid detection. They move so silently that predators who rely on their sense of sound cannot easily detect them. Blue, fin and minke whales produce such low frequency sounds that killer whales, which are one of their main predators, cannot detect their presence. This enables them to communicate without alerting predators to their location. Mother and calf pairs will often also use acoustic crypsis as a survival strategy to avoid attracting predators. Another important reason why whale song matters is because whales also use song to navigate oceans where visibility can be limited.

However, the natural harmony of whale song is threatened by humans and particularly by human-generated noise. Larger commercial ships and fishing boats create continuous low frequency sounds, which makes it difficult for whales to distinguish these sounds from whale calls and hear each other. Whales often adapt in these circumstances by changing their pitch or they stop singing altogether. Seismic surveys used in oil exploration throw off whales with sudden loud sounds which can cause panic, with whales stranded or calves separated from their mothers. Sonar used by the military has a similar confusing effect. Continuous sound from offshore wind farms can disrupt mating calls and feeding patterns. Pollution is another major threat to whale communication, as it weakens their overall health. This makes producing vocalisations more of an effort, which can affect their migration. Any disruption to whale song

will affect mating. Humpback whales in particular have complex song sequences that are produced by males during the breeding season. If a female humpback whale cannot interpret a potential mate's song, their mating success will be reduced. Predators may have a greater success rate if whales cannot effectively communicate warnings to each other. Whale song is a great example of harmony in nature. It helps whales find each other, communicate, protect their young and survive in vast oceans. However, human noise threatens this natural balance and their ability to migrate, mate and protect themselves. Protecting the seas from noise pollution will preserve this natural harmony and ensure these gentle giants can continue to communicate and thrive across our vast oceans. The harmony of whale song reminds us that even the largest creatures on Earth rely on delicate and fragile systems in order to survive.

Bibliography

- Baisas, Laura. "We Finally Know How Baleen Whales Make Noise." *Popular Science*, February 21, 2024. <https://www.popsci.com/environment/how-whales-make-noise/>.
- Briggs, Helen, and Victoria Gill. "Whale Song Mystery Solved by Scientists." *BBC News*, February 22, 2024, sec. Science & Environment. <https://www.bbc.co.uk/news/science-environment-68358414>.
- Cormier, Zoe. "The Loudest Voice in the Animal Kingdom." *Bbcearth.com*, 2020. <https://www.bbcearth.com/news/the-loudest-voice-in-the-animal-kingdom/>.
- The Editors of Encyclopaedia Britannica. "Baleen Whale | Mammal." In *Encyclopædia Britannica*, 2019. <https://www.britannica.com/animal/baleen-whale>.
- iwc.int. "Anthropogenic Sound," n.d. <https://www.iwc.int/management-and-conservation/environment/anthropogenic-sound>.
- NOAA Fisheries. "Blue Whale | NOAA Fisheries." *Noaa.gov*. NOAA Fisheries, September 28, 2023. <https://www.fisheries.noaa.gov/species/blue-whale>.
- US. "Why Do Whales Make Sounds?" *Noaa.gov*, 2026. <https://oceanservice.noaa.gov/facts/whalesounds.html?>
- ———. "Ocean Noise | NOAA Fisheries." *NOAA*, October 25, 2021. <https://www.fisheries.noaa.gov/national/science-data/ocean-noise>.

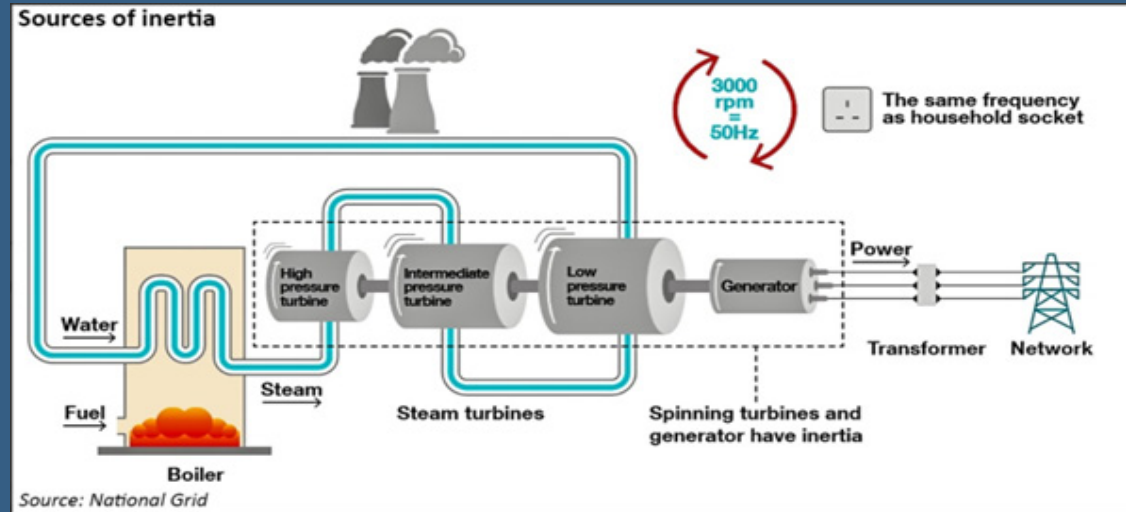
Harmony in the Energy Grid

JESSICA, YEAR 9
MENTORED BY COCO, YEAR 11

Inertia is the tendency of an object to remain in its current state of motion, and all objects have it, whether they are moving or not. This occurs in day-to-day life – for example, when the engine of a car stops, the vehicle doesn't immediately stop moving. This is because of inertia, which causes the object – in this example, the car – to remain moving and slow down more gradually. In the context of the energy grid, this is crucially important, because it keeps the supply of electricity in balance and harmony with the demand. Harmony in the energy grid is essential to keep it running: when the frequency drops or rises suddenly, it can lead to grid crashes, causing blackouts and power shortages. These are hugely disruptive. Last time an event like this happened in the UK in 2019, it affected more than 1 million people, and although this was caused by a complex combination of factors, it is a good example of why harmony is so important in this context.

Traditional synchronous generators (shown in the diagram) naturally have inertia because of spinning parts that rotate at a frequency that helps to balance the supply and demand in the grid. The spinning parts in these generators store rotational kinetic energy, and, like in the example of the car, are resistant to sudden changes in speed, allowing them to slow down the rate of change of frequency (RoCoF) even if there is a sudden drop in the amount of energy being supplied, which would happen if the generator stopped. However, these generators are typically driven by non-renewable energy sources, generally coal, oil and gas, and although spinning generators naturally produce inertia, most renewable

energy sources like solar and wind do not, as they have no machinery that can slow down a change in output. This means that, as these sources are integrated into the grid, there is less inertia, which raises the chance of a sudden change in frequency and therefore the chance of the grid crashing.



One solution to this issue is synthetic inertia: the controlled response of a generator to replace the inertia provided by rotating machinery. This is known as a Fast Frequency Response (FFR) and essentially works by using either a reserve of energy that has been stored, or being able to turn on a generator. If a generator were to fail, the grid operator would source energy from elsewhere fast enough to “inject” into the grid and make up for the change. This would likely have to happen within a few seconds at most, and if the frequency remained too low for more than a few minutes, it could trigger a blackout. As well as sources of energy that can be switched on quickly, batteries are also a way of generating synthetic inertia, meaning that as battery technology develops, more energy could be stored and more inertia gained. The challenge is that this either requires a source to be able

to start generating more energy almost instantaneously (which means it will be running below its full capacity most of the time to allow for an increase when needed) or for a battery to have large amounts of energy stored that can be released when needed.

To conclude, although these issues pose challenges, synthetic inertia is an exciting possibility that could have the potential to speed up the integration of intermittent renewable energy sources into the grid without losing stability and compromising on safety. As the sources of the electricity we use are shifting from oil, coal and gas to solar, wind and other renewables, and as governments around the world have committed to reducing their carbon emissions, synthetic inertia is incredibly important for preserving balance and safely integrating these new technologies.

Bibliography

- ARENA. 2022. “What Is Electricity Grid Inertia?” Australian Renewable Energy Agency. November 16, 2022. <https://arena.gov.au/blog/what-is-electricity-grid-inertia/>.
- National Grid. 2024. “How Much of the UK’s Energy Is Renewable?” *www.nationalgrid.com*. January 17, 2024. <https://www.nationalgrid.com/stories/energy-explained/how-much-uks-energy-renewable>.
- O’Brien, James. 2022. “Renewable Energy, Synthetic Inertia, and the US Grid - PSC Consulting.” PSC Consulting. May 12, 2022. <https://www.pscconsulting.com/renewable-energy-synthetic-inertia-and-the-us-grid/>.
- Porter, Kathryn. 2017. “Measuring Grid Inertia Accurately Will Enable More Efficient Frequency Management.” *Watt-Logic*. October 12, 2017. <https://watt-logic.com/2017/10/12/inertia/>.
- Sterling, John. 2019. “Synthetic Inertia and Its Role in Improving Grid Stability - Solar Power Portal.” *Solar Power Portal*. 2019. <https://www.solarpowerportal.co.uk/solar-projects/synthetic-inertia-and-its-role-in-improving-grid-stability>.
- “What Is Inertia? | National Energy System Operator.” 2025. *National Energy System Operator (NESO)*. 2025. <https://www.neso.energy/energy-101/electricity-explained/how-do-we-balance-grid/what-inertia>.

FAST FREQUENCY RESPONSE

The Pros and Cons of Societies Living in Harmony

▼
KAYA, YEAR 9
MENTORED BY ULA, YEAR 11

Across the world, many societies and communities view the idea of harmony differently, either in terms of happiness and peace or through the lens of the economy. At first glance, living in harmony is a good thing and it is beneficial for countries to live in this way, but is this easy way of life always better for communities in the long term? A harmonious society is classified as coexisting peacefully through mutual respect, understanding and maintaining a constant idea of balance. This essay will discuss how these ideas can be both positive and negative and explore different examples of countries in modern life and in history that have benefitted from both the pros and the cons of living in harmony.

There are many methods of measuring how harmonious a country is. One helpful scale is the Global Peace Index, which collects data from 163 independent states to rank countries according to overall happiness and peace. This approaches the idea of harmony by considering security, safety, and the absence of conflict. Each year since 2008, Iceland has consistently topped the charts, as the country has very low crime rates and maintains a very low level of conflict, both nationally and internationally. But harmony involves more factors than just the feeling of safety.

While the absence of threat plays a vital part in our understanding of harmony, there are further aspects to a balanced society. A crucial element is the relationships between people. Finland has topped the charts in the World Happiness Index for eight consecutive

years, as the country's fundamental values tie into a wider understanding of harmony. The reason why they are successful is because they value social cohesion, mutual respect, gender equality and the idea of maintaining the same consistent levels of happiness and calm instead of individual highs and lows. This can also be seen in Bhutan, where communities work together to maintain Gross National Happiness and focus on the quality of life rather than wealth measured exclusively in financial terms. Therefore, it goes without saying that these fundamental values of social cohesion and equality that are ingrained in day-to-day life lead to strong mental and physical health within these communities. So how could this way of life possibly have any downsides?

Throughout history, there have been many examples where living in these perfectly harmonious societies has reduced the need for innovation and development. When life is easy, there is a reduced need to strive for improvement. This could eventually endanger a community's way of life, as, if it has been taken for granted, the motivation to continue to enhance and develop might have declined. In contrast, there have been many cases where countries have rapidly accelerated progress culturally, economically and through innovation as a result of major setbacks due to war, natural disasters or a period of poverty. Many countries experienced this after the Second World War, as there was a need to rebuild and repair quickly after a devastating period of time.

One of the most notable examples of this is Japan. After surrendering in WWII, Japanese society, economy and industry were in ruins. However, due to a firm work ethic and investments in innovation, Japan saw drastic economic growth and became the second largest economy in the world in just a few decades. Not only did they

manage to recover from their major setback, but Japan became the world leader of many industries such as technology. Japan continues to be a thriving society today. In conclusion, the many aspects that come together to form a harmonious society are extremely beneficial to wellbeing and to overall happiness, but the absence of harmony inspires new ways of thinking and rapid development. It gives communities an incentive to work hard to reach the ideal of happiness and peaceful coexistence, and therefore, it is in some ways valuable to societies.

Bibliography

- Bird, Tim. "What It's like to Live in the Happiest Country on Earth." Bbc.co.uk. BBC, April 17, 2025. <https://www.bbc.co.uk/travel/article/20250416-what-its-like-to-live-in-the-happiest-country-on-earth>.
- D. Lewis. "Country Profile: Iceland." *Vision of Humanity*, August 11, 2023. <https://www.visionofhumanity.org/country-profile/iceland/>.
- Helliwell, J. F., Layard, R., Sachs, J. D., De Neve, J.-E., Aknin, L. B., & Wang, S. (Eds.). (2025). *World Happiness Report 2025*. University of Oxford: Wellbeing Research Centre. https://www.worldhappiness.report/ed/2025/?_bhlid=64d9590f721c8a00d8eb2d41364e0cf96926a847#appendices-and-data.
- "Identifying and Measuring the Factors That Drive Peace," 2025. <https://www.visionofhumanity.org/wp-content/uploads/2025/06/Global-Peace-Index-2025-web.pdf>.
- Institute for Economics & Peace. "Global Peace Index 2024," June 2024. <https://www.economicsandpeace.org/wp-content/uploads/2024/06/GPI-2024-web.pdf>.
- Jansen, Marius B, and Akira Watanabe. "Japan since 1945." In *Encyclopædia Britannica*, June 13, 2019. <https://www.britannica.com/place/Japan/Japan-since-1945>.
- Macdonald, Charles. "Order against Harmony." *Suomen Antropologi* 33, no. 2 (January 1, 2008): 5–21. <https://doi.org/10.30676/jfas.v33i2.116431>.
- Walcott, Susan M. "One of a Kind: Bhutan and the Modernity Challenge." *National Identities* 13, no. 3 (September 2011): 253–65. <https://doi.org/10.1080/14608944.2011.585633>.

GLOBAL PEACE INDEX

Harmony Between the Moon and Life on Earth

▼
KIKI, YEAR 9
MENTORED BY MARINA, YEAR 11

The Moon is essential to life on Earth. Without its gravitational pull, the earth's tilt would vary, causing dramatic seasonal changes, including ice ages, extreme weather, or even virtually no seasons at all. The ocean's tides would become around a third of what they are now, greatly hindering the chances of survival in coastal ecosystems. This would have a substantial impact on biodiversity not only in the ocean but everywhere in the world. Not only does the Moon influence the natural world, but it has influenced mythology for millennia. All of this highlights how the Moon is crucial to keeping harmony on Earth.



The mass spawning of coral in the Great Barrier Reef is an excellent example of how the Moon influences Earth's ecosystems.

The phenomenon of coral spawning occurs once a year, often several days after the full moon, between the months of October and December. To increase the chances of fertility, the coral must release their egg and sperm at the same time. The spawning usually happens in a tight window of

around ten to thirty minutes, which means that it is crucial for the coral to spawn at the correct time. Scientists believe that they do this by timing their release to the phases of the Moon. Coral and other species are known to contain light-sensitive proteins called cryptochromes. These are thought to detect moonlight, allowing the coral to time their spawning. However, the specific details on the mechanism of this are still shrouded in mystery.

Folklore has, for thousands of years, presented the Moon as being powerful and influential. Civilisations 30,000 to 40,000 years ago created a myriad of myths regarding the creation of the Moon. For example, in Ancient Greece they believed that the Moon, named Selene, was the daughter of the god Hyperion and the goddess Theia, who had a luminous face. She was thought to ride her lunar chariot, pulled by bulls, through the night sky. However, since then, these myths have evolved and new superstitions have arisen. The widespread belief for thousands of years has been that the Moon has the power to drive us mad. This is even how we get the word lunacy, which is derived from the Latin word 'luna', meaning moon. A multitude of experiments have been done to try to find a connection between the Moon and elements of human swings. A study in 2021 compared the sleep patterns of a group of college students living in Seattle with three indigenous communities in Argentina. In both scenarios, participants went to sleep later and got less sleep overall during the days leading up to the full moon. From these results, researchers hypothesised that we have an innate adaptation to make the most of natural light. However, although there are many experiments that imply that the moon affects us in some way, there are also many which suggest there is no correlation between our behaviour and the Moon.

Scientists believe this to be an illusory correlation, where we believe that two stimuli

share a relationship when, in reality, they may not. Although research doesn't prove that the Moon affects sleep patterns, evidence shows that it can affect people with bipolar disorder. It is thought that the rapid cycling of bipolar disorder may align with the tidal phases of the Moon. Regardless of whether its effects on us can be scientifically proved, the Moon still influences our superstitions and myths.



The Moon is not just a distant object in our sky, but, in fact, a key asset to life on Earth. From ensuring the survival of coral species to supporting coastal ecosystems and regulating tides, the Moon has a deep harmonious link with the natural world, as well as the mythical one. For centuries, the Moon has been at the heart of mythology and folklore, shaping our beliefs on how it affects our lives. Ultimately, both the Moon's natural and mythological connections reveal its harmony with life on Earth.

Bibliography

- Albers, Susan, 'Does The Moon Affect Humans?' Cleveland clinic (2022) <https://health.clevelandclinic.org/moon-effects-on-humans>
- Alon, Shahar; Hoegh-Guldberg, Ove; Kaniewska, Paulina; Karako-Lampert, Sarit; Lavy, Oren, 'Signaling cascades and the importance of moonlight in coral broadcast mass spawning,' eLife, Vol. 4 (2015) <https://pmc.ncbi.nlm.nih.gov/articles/PMC4721961/>
- Brannon, Skylar M., De Houwer, Jan, Gawronski, Bertram, Ratliff, Kate, Van Dessel, Pieter, 'Illusory-Correlation Effects on Implicit and Explicit Evaluation.' *Personal and Social Psychology Bulletin*, Vol. 47 (2020) <https://journals.sagepub.com/doi/10.1177/0146167220977706>
- Grover, Natalie, 'Lunar cycle has major effect on sleep, study suggests' the Guardian (2021) <https://www.theguardian.com/lifeandstyle/2021/jan/27/lunar-cycle-has-distinct-effect-on-sleep-study-suggests>
- Hammond, Claudia, 'Does a full moon make people mad?' BBC future (2013) <https://www.bbc.co.uk/future/article/20131029-does-a-full-moon-make-people-mad>
- Koosmen, Tanika, 'The ancient origins of werewolves', The Conversation (2018) <https://theconversation.com/the-ancient-origins-of-werewolves-104775>
- Lotzof, Kerry, 'How does the moon affect life on Earth?' Natural History Museum (2019) <https://www.nhm.ac.uk/discover/how-does-the-moon-affect-life-on-earth.html>
- Markandaya, Virat, 'How lunar cycles guide the spawning of corals, worms and more.' Knowable Magazine, (2023) <https://knowablemagazine.org/content/article/living-world/2023/lunar-cycles-guide-spawning>
- Moore, Marissa, 'How Does a Full Moon Affect Bipolar Disorder Symptoms?' Psych Central (2022) <https://psychcentral.com/bipolar/full-moon-bipolar-disorder>
- Summer, Jay Vera; Peters, Brandon, 'Do Moon Phases Affect your Sleep?' Sleep Foundation (2021) <https://www.sleepfoundation.org/how-sleep-works/do-moon-phases-affect-sleep#references-80365>
- The Editors of Encyclopedia Britannica, 'Selene | Greek and Roman mythology,' Encyclopædia Britannica (2018) <https://www.britannica.com/topic/Selene-Greek-and-Roman-mythology>
- Wehr, Thomas, 'Bipolar mood cycles associated with lunar entrainment of a circadian rhythm,' *Translational Psychiatry* (2018) <https://pmc.ncbi.nlm.nih.gov/articles/PMC6089884/>
- White, Tom S. '3 ways the moon affects nature,' BBC Wildlife (2019) <https://www.discoverwildlife.com/animal-facts/ways-moon-affects-wildlife>

Do Symmetry and Perceived Beauty Work in Harmony with Each Other?

KITTY, YEAR 8

MENTORED BY CHARLOTTE, YEAR 10

In the context of my essay, harmony refers to the correlation between two concepts: symmetry and perceived beauty. Several studies show that you are more likely to be perceived as attractive if you have more symmetrical facial features. In this essay, I will explore if this is true; if so, why this is the case; if you can still be viewed as beautiful if you have asymmetric features; and whether any societal norms have shaped this.

Firstly, I will explore whether symmetrical facial features always lead to perceived beauty. Research has shown that symmetry in faces is often linked with good genetic quality and healthy facial skin. A study by Little et al compared beauty preferences for symmetrical faces in the Tanzanian hunter-gatherer tribe Hadza with overall consensus in the UK. In the UK, having a symmetrical face was preferred, but it was much more strongly desired in the Hadza tribe. Those Hadza men who could hunt well often placed greater value on the symmetry of the female's face, showing that the more important people in society (in this case, the best hunters) are more selective in their choice of faces. The study suggests that liking symmetry is an ancestral trait, but it can be influenced by cultural differences or personal circumstances. However, another study by Swaddle and Cuthill suggests people can still be seen as beautiful if they have naturally asymmetrical features. Some facial features, like the nostrils and ears, are meant to be asymmetrical and it can be odd or unsettling if these features are symmetrical.

So why does symmetry correlate with perceived beauty? Good genetic quality

and wellbeing are important factors when choosing a mate. Wanting someone with symmetrical facial features dates back to our ancestors, indicating a relationship. A study by Scheib et al shows that, during development, a person's genes provide a blueprint for a symmetrical and healthy body, but other factors can interfere and lead to asymmetry. Other research, such as a study by Jones et al, shows that symmetry is not the only influence on perceived beauty. Clear or unblemished skin suggests good reproductive qualities, which is also essential for choosing a mate. This could be why it is seen as a beautiful feature. Furthermore, the golden ratio is found in nature and represents beauty. If facial proportions align with the golden ratio, the face is usually seen as attractive.

I have established that having symmetrical features means people are more likely to be perceived as beautiful. Now, I will look at the impact that being beautiful has on success in life. Little et al's study suggests that having beautiful features meant people were more likely to be chosen for a job and promoted. People with beautiful features are often seen as smarter and healthier than those with unattractive features and are more likely to be found innocent in a court of law. These are clear signs of societal bias, as people make positive attributions to beauty. Another study by Lemay et al shows that "what is beautiful is good because what is beautiful is desired". This shows that, since many people value beauty in their lives, they are more likely to bond with people they perceive as beautiful and give them what they want when compared with less attractive people.

Although symmetry is proven to be a sign of beauty, it is important to remember that beauty is in the eye of the beholder. Some people find a symmetrical face creepy or unsettling, as seen in AI-generated avatars, while others find asymmetrical faces strange or odd. Overall, symmetry works in harmony with perceived beauty.

Bibliography

- Dimitrov, Dimitre, and George Kroumpouzou. 2023. "Beauty Perception: A Historic and Contemporary Review." *Clinics in Dermatology* 41 (1): 33–40. <https://doi.org/10.1016/j.clindermatol.2023.02.006>.
- Jones, B.C., A.C. Little, D.R. Feinberg, I.S. Penton-Voak, B.P. Tiddeman, and D.I. Perrett. 2004. "The Relationship between Shape Symmetry and Perceived Skin Condition in Male Facial Attractiveness." *Evolution and Human Behavior* 25 (1): 24–30. [https://doi.org/10.1016/s1090-5138\(03\)00080-1](https://doi.org/10.1016/s1090-5138(03)00080-1).
- Lemay, Edward P., Margaret S. Clark, and Aaron Greenberg. 2010. "What Is Beautiful Is Good Because What Is Beautiful Is Desired: Physical Attractiveness Stereotyping as Projection of Interpersonal Goals." *Personality and Social Psychology Bulletin* 36 (3): 339–53. <https://doi.org/10.1177/0146167209359700>.
- Little, A. C., B. C. Jones, and L. M. DeBruine. 2011. "Facial Attractiveness: Evolutionary Based Research." *Philosophical Transactions of the Royal Society B: Biological Sciences* 366 (1571): 1638–59. <https://doi.org/10.1098/rstb.2010.0404>.
- Little, Anthony C, Coren L Apicella, and Frank W Marlowe. 2007. "Preferences for Symmetry in Human Faces in Two Cultures: Data from the UK and the Hadza, an Isolated Group of Hunter-Gatherers." *Proceedings of the Royal Society B: Biological Sciences* 274 (1629): 3113–17. <https://doi.org/10.1098/rspb.2007.0895>.
- Scheib, Joanna E., Steven W. Gangestad, and Randy Thornhill. 1999. "Facial Attractiveness, Symmetry and Cues of Good Genes." *Proceedings of the Royal Society of London. Series B: Biological Sciences* 266 (1431): 1913–17. <https://doi.org/10.1098/rspb.1999.0866>.
- Simmons, Leigh W., Gillian Rhodes, Marianne Peters, and Nicole Koehler. 2004. "Are Human Preferences for Facial Symmetry Focused on Signals of Developmental Instability?." *Academic.oup.com*. September 1, 2004. <https://academic.oup.com/beheco/article-abstract/15/5/864/318486?redirectedFrom=fulltext#no-access-message>.
- Swaddle, John P, and Innes C Cuthill. 1995. "Asymmetry and Human Facial Attractiveness: Symmetry May Not Always Be Beautiful." *Proceedings of the Royal Society of London. Series B: Biological Sciences* 261 (1360): 111–16. <https://doi.org/10.1098/rspb.1995.0124>.
- Youvan, Douglas C. 2025. "Facial Symmetry as a Genetic Health Indicator: Evolutionary and Psychological Perspectives on Human Attraction." *ResearchGate*. February 18, 2025. <https://doi.org/10.13140/RG.2.2.28570.15044>.
- www.cambridge.org/elt/blog/2021/06/22/the-influence-other-languages-english/.

A World in Harmony

LEIGH, YEAR 8

MENTORED BY DIYA, YEAR 9

If the whole world was in complete harmony, there would be so many positive things that would be upside down, but nothing can ever be good. There must be some downsides to a world where everyone is in harmony. Utopia really is as great as it sounds.

There are countless great things in our world where everyone is in harmony. There are no conflicts, no murders, no wars, no

SOCIETAL BIAS

needed; much less sickness (as a positive mental health can affect physical health and make it better); and no starving, as more money could be put towards farmers and people in need. However, there are also many negatives. People would become bored and think there was no point in life anymore as there would be no challenges to face and overcome, which also means that we would not build the skill of resilience.

As well as that, there would be no sadness, which may seem like a good thing, but can a person be happy if they have never experienced unhappiness? If we are never sad, then we will not savour the great moments as much. Without sadness, there would be no happiness.

Furthermore, in a slightly unharmonious world, you would probably have more friends than you would in a completely harmonious world, as similar struggles, hardships or challenges bring people closer together and this strengthens people's trust with each other if they know that the other person is going through what they are going through.

Healthy disagreement, competitions, and debates between different ideas are important for change and the development of society. If we didn't have arguments like these, we would get nowhere, with no solution nor progress. Also, is the elimination of conflict worth the loss of free will? To make the world completely in harmony, you wouldn't be able to speak out about what you think is wrong or should be changed, and you would lose the capability of being able to do what you like, even if that's just saying 'no' to a waiter who recommends that you have basil on your pizza. You would not be able to tell the waiter that you do not like basil and you do not want it: you would just be stuck with it.

In conclusion, all of this shows that a world in complete harmony or a Utopia is not a good idea and comes at a great cost. In a Utopia, there would only be one opinion that would

ever get heard and it could not be changed without making the world unharmonious again. You could never fight for what you believe is right, you would get very bored, you would not be happy and you would probably have fewer friends. Instead, we should have a world with a good balance of harmony and disagreement. We should not remove all conflict but manage it fairly so that we can have peace and progress.

Bibliography

- Contributor, WebMD Editorial. 'How Does Mental Health Affect Physical Health?' WebMD, <https://www.webmd.com/mental-health/how-does-mental-health-affect-physical-health>. Accessed 10 Feb, 2026.
- Jnerst, -. 'Why Utopia Fails'. Everything Studies, 24 Sept. 2022, <https://everythingstudies.com/2022/09/24/why-utopia-fails/>.
- Mudumba, Rajeev. 'War And Peace — Pros & Cons'. Mind Talk, 21 Apr. 2022, <https://medium.com/mind-talk/war-and-peace-pros-cons-39dffeab0b92>.
- Oguntoye, Farouq. 'Can a Person Be Happy If They've Never Experienced Sadness?' Medium, 28 Oct. 2023, <https://medium.com/@farouqoguntoye05/can-a-person-be-happy-if-theyve-never-experienced-sadness-03d3bd2258a2>.

Could Honeybees Hold the Secret to Harmony in the Human Race?

▼
MARINA, YEAR 8
MENTORED BY AMELIE, YEAR 10

The concept of harmony is generally one we would associate with more sophisticated species, not with insects like honeybees. But when you take a moment to review their culture, honeybees are a prime example of harmony in nature. It may seem strange to compare honeybees to humans, as outwardly we appear to have nothing in common. But honeybees are actually extremely intelligent and skilled at survival. There is much we can learn from honeybee society about living together peacefully.

Studies have shown that honeybees' intelligence is greater proportionately to their size when compared to larger animals. Scientists found that, when trained to receive a food reward after passing a specific number of landmarks, honeybees were able to tell how many they had passed even when the distance between the landmarks was varied. Honeybees have a sophisticated culture and are able quickly and

efficiently to communicate where a flower is to other bees using a technique known as the 'waggle dance'. This describes the location, distance from the hive and even how delicious the flower is, and they are thought to be one of the only species of insect to do this. Humans may communicate in more detail but definitely do not always share valuable information with their neighbours!

Honeybees are extremely organised and efficient and live harmoniously together in a structured hierarchy, with jobs allocated depending on the genes with which the bees were born. Their society is split into three sections: queens, workers and drones. There is one queen bee per hive. She is the only sexually developed female and is primarily responsible for birthing new bees, whether fertilised or unfertilised. A queen bee is developed from a young female bee under three days old which is fed on royal jelly until it is fully developed. Queens mate about one week after they emerge from their cells with males from other hives to avoid inbreeding. Male bees are known as drones and their purpose is to mate with queens from other hives to produce fertilised eggs. Females, birthed from fertilised eggs, will become worker bees. It is their job to feed undeveloped eggs if they are young, and to gather nectar to turn into honey if they are older.



DANCE WAGGLE

Honeybees are very interdependent in their hives and on a broader scale, as shown by the practice of queens mating with drones from different hives to strengthen their gene pool. Although humans interact differently, they, like honeybees, must work together in order to survive. We live in a time where it is essential that we work together as a species, and with other species, to navigate the world. As we are forced into closer contact with one another by climate change and overpopulation, it will become ever more important that we adapt our way of living to avoid conflict and disharmony.

As materials become more limited, humans need to learn how to build more efficiently. We should look to nature's best engineers, the honeybees, who use hexagonal cells in their hives. The hexagon, while seemingly complex, actually uses the least amount of wax to build due to its compact structure, so would use less building materials in human architecture.

Although honeybees are undoubtedly different from us due to the fact that they are genetically allocated jobs in society, we can still be inspired by elements of their culture. Of course, human society is much more complex and involves more than three sets of workers, but when broken down into a rudimentary format, we are not so different from those who fly above our heads. Who knows? One day, we may live in hexagonal houses!

Bibliography

- *Asu.edu. (2017). Honey Bee Colonies | Ask a Biologist. [online] Available at: <https://askabiologist.asu.edu/bee-colony-life>.*
- *l'Anson Price, R. and Grüter, C. (2015). Why, When and Where Did Honey Bee Dance Communication evolve? Frontiers in Ecology and Evolution, 3. DOI: <https://doi.org/10.3389/fevo.2015.00125>.*
- *Dacke, M. and Srinivasan, M.V. (2008). Evidence for counting in insects. Animal Cognition, [online] 11(4), pp.683–689. doi:<https://doi.org/10.1007/s10071-008-0159-y>.*
- *Krulwich, R. (2020). NPR Choice Page. [online] Npr.org. Available at: <https://www.npr.org/sections/krulwich/2013/05/13/183704091/what-is-it-about-bees-and-hexagons>.*
- *University of Delaware (n.d.). The Colony and Its Organization. [online] Mid-Atlantic Apiculture Research and Extension Consortium. Available at: <https://canr.udel.edu/maarec/honey-bee-biology/the-colony-and-its-organization/>.*

The Great Pacific Garbage Patch Cleanup

▼
OLIVIA, YEAR 7
MENTORED BY AMELIE, YEAR 9

The largest of five garbage patches, the Great Pacific Garbage Patch, is an island of plastic between Hawaii and California, pulled together by ocean currents. With a mass of 80,000 kilograms, it is three times the size of France and it has been growing exponentially for nearly 70 years. The Great Pacific Garbage Patch covers an area of 1.6 million km², filled with 1.8 trillion pieces of plastic, equating to 250 pieces of plastic for every person on the planet.



Image 1 – The Great Pacific Garbage Patch

Surprisingly, 92% of the whole garbage patch is made up of larger objects, with 46% of the patch being fishing nets. Modern research has uncovered that waves, wind and UV light break down or fragment the plastics into microplastics and these are tragically ingested by marine life. When plastic reaches the ocean, it will remain there for centuries. A fishing line, plastic bottle, aluminium can and a plastic bag can take 600, 450, 200 and 20 years to break down respectively. Experts estimate that by 2050, the plastic in the oceans will outweigh all the world's fish. This ironic cycle of individuals polluting the ocean and subsequently consuming the same waste by eating marine life means that, even if we attempt to remove all the plastic from the ocean, we still need to tackle the issue at source.

There are companies attempting to tackle the removal of plastic in our oceans and at source. The Ocean Cleanup company, founded by Boyan Slat, developed System 03, a cleaning system that removes plastic from the ocean. The system consists of a 2.2 km floating barrier, which is towed between two slow-moving U-shaped vessels that collect the plastic. The barrier suspends a screen extending 4m below the water surface, where most of the floating plastic is encountered. Once the barrier is full, the plastic is taken out of the ocean and sorted into recyclables.

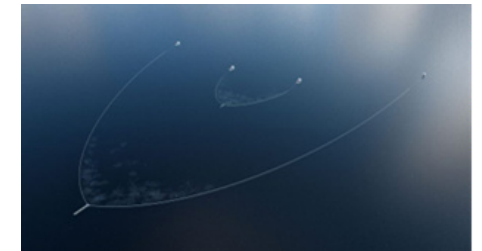


Image 2 – System 03



Image 3 – System 03 (Floating Barrier)

In developing countries in particular, much rubbish ends up in rivers. Weather storms or heavy rainfall cause rubbish and debris to enter rivers, events referred to as 'flushes'. To tackle this, river interceptors have been developed – solar powered, catamaran-like vessels with a barrier and conveyor belt system that use natural forces (river currents and solar power) to catch and extract river rubbish before it reaches the ocean. River booms are another solution to the river rubbish problem. They are floating barriers

that stop debris and rubbish; they are very similar to interceptors but less active and not powered by river currents and solar power.

Since the industrial revolution, we have invented tools and items ahead of our time, while other closely related primates continued their natural course of living. Overpopulation, poverty, and miseducation about waste are among the many factors causing the colossal increase in ocean plastics. And whilst our primate relatives have continued with their natural course of living, they too have been inadvertently impacted by the increase in plastics within the environments they inhabit, which ultimately affects the harmonious life they once enjoyed.

Crucially, as well as the cleanup methods being implemented, we need more worldwide educational awareness to prevent people disposing of plastic and to teach respect for the environment, whether land or sea. It has never been more important to place waste facilities in countries where they have not yet been introduced and to implement regular collections of household waste. We cannot expect companies to remove all plastic from our oceans if we continue to put more in, therefore it has never been more important that we move forward to rebuild a harmonious relationship with the environment around us.

Bibliography

- Cho, Renée, *How Do We Clean Up All That Ocean Plastic? – State of the Planet*. 13 Oct. 2022, <https://news.climate.columbia.edu/2022/10/13/how-do-we-clean-up-all-that-ocean-plastic/>.
- *Insider Science*, 'How Big The Great Pacific Garbage Patch Really Is', YouTube, 2018. <https://www.youtube.com/watch?v=vrPBYS5zzF8>. Accessed 10 Feb. 2026.
- 'Ocean Plastic: How Tech Is Being Used to Clean up Waste Problem'. BBC News, 27 Feb. 2023. Technology. www.bbc.co.uk, <https://www.bbc.co.uk/news/technology-64744926>.
- *The Ocean Cleanup*, 'The Great Pacific Garbage Patch Explained', YouTube, 2018. <https://www.youtube.com/watch?v=0EyaTqezSzs>. Accessed 10 Feb. 2026.
- 'Rivers – The Interceptor – The Ocean Cleanup'. *The Ocean Cleanup*, 6 Feb. 2026, <https://theoceancleanup.com/rivers/>.
- World Economic Forum, Ellen MacArthur Foundation and McKinsey & Company, *The New Plastics Economy: Rethinking the future of plastics*, 2016.

How Does Geography Shape Culture and Make or Defeat Harmony Among People and Nations?

ROSE, YEAR 10
MENTORED BY TILLY M, LOWER SIXTH

Natural and manmade geographical features, landscapes and climates play a pivotal role in shaping world harmony and the relationships between people and nations, influencing the dynamics between and within different societies.

Firstly, some geographical features cause conflict rather than harmony. For example, the construction of the GERD (Grand Ethiopian Renaissance Dam) has sparked debates over water distribution and the rights of downstream nations that rely on the Nile for a water source, hydroelectric power and agriculture. The purpose of the dam is to provide inexpensive electricity to 70% of Ethiopia's population, benefitting their quality of life and the economy. The building of this dam began in 2011 on the Blue Nile in Ethiopia, located about 9 miles east of the border with Sudan. It fills a reservoir with a water volume of 74 cubic kilometres, making it a prominent and easily recognisable landmark. It has raised concerns about reduced water availability in Egypt and Sudan and has heightened political tensions between the countries. The Egyptian government fears that the dam will reduce its water supply by a significant 20%. However, there is little action that Egypt is willing to take, as military action would lead to more conflict. Additionally, the GERD came with an extreme economic impact, as its \$4.5 billion cost was funded primarily by Ethiopian taxpayers, adding financial strain to the population. Therefore, we can see that this manmade feature creates friction between neighbouring countries, while also creating internal harmony within the nation.

Conversely, geographical features can unite nations and foster international cooperation. The Alps is a broad mountain range in Europe that stretches across eight countries: France, Switzerland, Austria, Germany, Monaco, Italy, Liechtenstein and Slovenia. The Alpine Convention of 1991 is a treaty to protect the mountainous landscape and ecosystems, and to manage resources across borders. This means that, through alpine tourism and a shared landscape that should be preserved, these countries work together with a common culture of snowsports, folklore, architecture and music, supporting a cohesive international harmony.

To take a different example, Lake Victoria unites over 47 million people across East African countries through a huge fishing industry, trade and infrastructure development. It is used by many different people for basic needs such as drinking water, for washing clothes and for cooking. On a cultural level, the people of Catania and surrounding regions are brought together by a shared view of Mount Etna as a nurturing mother and an integral aspect of life there. This leads many Sicilians to call the volcano 'Mama Etna'. This demonstrates that harmony can be created between people, as connections form through shared perspectives of historical geological formations.

On the other hand, nations are in conflict over ownership of Greenland, which contains vast untapped oil and gas reserves and rare earth minerals. It provides access to new, faster shipping routes as a result of climate change and could be vital for NATO monitoring foreign naval vessels. Since being re-elected, President Trump has sought to acquire Greenland to prevent it from falling to China or Russia, as he views it as vital for national security. However, Greenland is a semiautonomous region of Denmark and has been for nearly 50 years, meaning that US-European relations have been damaged, as Denmark is not willing to give away

Greenland. The population of 57,000 have been led to feel unheard in a battle between powerful nations and governments and feel as if Trump 'should mind his own business', as said by Lars Vintner, a Greenlander. This proves that conflict can occur on a political and geographical basis due to differing national interests, even between allies.

In conclusion, while geography both unites and creates friction between countries, I think that geographical features mainly bring together people and create a shared culture rather than cause conflict. This is because people need to adapt to life near a feature that brings people together. We can see that, if geography shapes world harmony, conflicts and culture, it influences the entire world around us.

Bibliography

- *Cave, Peter, Humanism: A Beginner's Guide*. Oxford: 'Denmark vs the US: What Greenland Really Wants'. BBC News, 3 Feb. 2025, <https://www.bbc.co.uk/news/articles/c4gpgqzqym>.
- Williamson, Jess. 'Everything You Need to Know About Iguazu Falls'. *Insight Vacations*, 19 Aug. 2025, <https://www.insightvacations.com/blog/everything-you-need-to-know-about-iguazu-falls/>.
- 'BBC One - Seven Worlds, One Planet - Protecting a South American Wonder of the World: Iguazu Falls'. BBC, <https://www.bbc.co.uk/programmes/articles/5MbnkwmJmQ1zprksTVR5mF/protecting-a-south-american-wonder-of-the-world-iguazu-falls>. Accessed 6 Mar. 2026.

The Harmony of the Spheres - Can Planets Make Music?

TILLY, YEAR 10

MENTORED BY ANNA & JULIA, YEAR 11

“The diversity of the phenomena of nature is so great, and the treasures hidden in the heavens so rich, precisely in order that the human mind shall never be lacking in fresh nourishment.” This comment, by the famous mathematician and astronomer Johannes Kepler, is as true today as it was when it was spoken over 400 years ago. His view of the universe certainly manifests in his work, notably in his development of Pythagoras’ Musica Universalis theory, also known as the Harmony of the Spheres. In it, Pythagoras, and later Kepler, theorised the existence of an interplanetary harmony that occurs throughout the universe. It is, however, important to note that their views of ‘the universe’ were limited to a few of the planets within our own solar system, although the harmony likely would have been applicable to the entire universe as we know it. The works of both Kepler and Pythagoras are well known for combining spiritual and religious beliefs with rigorous scientific principles; Kepler was a devout Christian and believed that if humans were created in the image of G-d, they must be able to understand the complex mathematical and scientific construction of the universe.

Kepler only began developing the theory later in his life, despite studying astronomy for much of his career, drawing on initial research from Pythagoras, who, with his followers, created and popularised the theory. Pythagoras, through experimenting with different instruments such as the lyre, discovered perfect and imperfect intervals in music, constituting some of the first work on cadences. He then measured the distances between the Earth and the Supreme Heaven,

the Earth and the Sun, and the Supreme Heaven and the Sun, and made an incredible discovery: the celestial measurements matched the ratios of the perfect musical intervals of the octave, fifth and fourth. These findings were incredibly significant in Pythagoras’ research, as he was a pioneer in linking the fields of music and astronomy. He quickly used his findings to create his Musica Universalis theory, which was supported by numerous prominent scientists from centuries ago, including Plato, Aristotle and Boethius. Pythagoras theorised that when the planets reach a specific state of alignment, a harmony is produced – one that cannot be heard with the ears, but felt with the soul. The theory was a blend of both the spiritual and the scientific – exactly what attracted Kepler to it in the first place. Kepler further developed the theory by proposing that the planets’ distances from the Sun in relation to the lengths of their orbits were also relevant. As such, the conditions required for the harmony to be created were so unlikely that Kepler thought that it may not have occurred since the beginning of the universe.

Despite the underlying religious controversy surrounding astrology in early seventeenth-century Christian society, it was widely accepted by the masses, and was in fact a highly admired practice, especially in the upper echelons of society. This attention helped Kepler and his work to gain the approval of many elites; even the English king at the time, James I, owned a copy of Kepler’s book *Harmonices Mundi*, which was specially dedicated to him.

The Musica Universalis theory has since been disproven, but it still stands as a testament to the curiosity of the human race. Even before the invention of the telescope, Pythagoras could measure the distance between celestial objects and link these measurements to musical harmonies. Kepler was able to pioneer a new approach to astronomy with his unique religious

perspective. Throughout history, astronomical theories such as *Musica Universalis* have served to demonstrate the excellence and profound, spiritual nature of the human mind.

Bibliography:

- Armstrong, Dave. “16th-17th Century Astronomers Loved Astrology (Part Two).” *Biblical Evidence for Catholicism*, April 15, 2019. <https://www.patheos.com/blogs/davearmstrong/2019/04/16th-17th-century-astronomers-loved-astrology-part-two.html>.
- Berna, Linda. “Celestial Bodies, Celestial Music - Guarneri Hall.” *Guarneri Hall*, September 8, 2025. <https://guarnerihall.org/celestial-bodies-celestial-music/>.
- Field, J.V. “Johannes Kepler - Biography.” *Maths History*, April 1999. <https://mathshistory.st-andrews.ac.uk/Biographies/Kepler/>.
- University College Oxford. “Kepler’s *Harmonices Mundi*,” April 13, 2014. <https://www.univ.ox.ac.uk/news/keplers-harmonices-mundi/>.
- Wikipedia Contributors. “Johannes Kepler.” *Wikipedia*. Wikimedia Foundation, February 2, 2019. https://en.wikipedia.org/wiki/Johannes_Kepler.

PYTHAGORAS' MUSICA UNIVERSALIS THEORY

HARMONY



South Hampstead

High School

G D S T

South Hampstead High School
3 Maresfield Gardens
London NW3 5SS
senior@shhs.gdst.net

020 7435 2899
www.shhs.gdst.net

South Hampstead's Lower School Academic Scholars contribute to the Pilot Light journal as well as participating in symposia and cultural trips. Cover artwork created by one of our Sixth Form Art Scholars, Nancy.

South Hampstead High School is part of the Girls' Day School Trust, a limited company registered in England, number 6400, and a registered charity, number 306983. www.gdst.net