

Art and Science: A place of art in Science and Physics

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Abstract— Traditionally, science and art have been portrayed as two distinct fields with wholly different aims, approaches, and audiences. Many artistic endeavours are inspired by the wonder and beauty of science. The beauty of science and the beauty of art have been contrasted, and both are found to be harmonious. A case is made for turning the beauty of science into art about science because it serves as a powerful source of motivation for scientific endeavour. This article went into great length about how art and science interact, as well as the beauty of nature in science.

Keywords— Science, Art and science communication

I. INTRODUCTION

THE visual arts are deeply ingrained in society as a whole and have the power to move, heal, communicate, give joy, and let one see the bigger picture of their own lives. They frequently provide information and can help validate what we do, how we do it, and how we communicate it to others. Sometimes a work of art speaks so plainly and forcefully that no explanation is required. In both the public and private spheres, art can have moral significance, impact, and even assist to awaken conscience.

To describe this link has previously been the subject of numerous attempts. S. Chandrasekhar elaborates on the mathematical features of theories in his book *Truth & Beauty: Aesthetics and Inspirations in Science*. The melodic arrangement that a mathematical model of nature produces appeals to him. He discussed the General Theory of Relativity in order to arrive at two criteria for judging scientific ideas as works of art: a) oddity that inspires awe and amazement, and b) "the conformity of the parts to one another, and to the whole." James McAllister advanced a different theory of scientific revolutions in contrast to Thomas Kuhn's in his book *Beauty and Revolution in Science* by explaining the historical development of sciences in terms of aesthetic judgements of scientific theories. Montano has expanded and modified McAllister's work while discussing the aesthetics of mathematics and science.

Martin Kemp, an art historian, exhorts us to go beyond the straightforward and fairly superficial relationship between science and art. The interaction between science and art is centered on several key factors. These include the challenges posed by mental and physical constructs, the communicative and social impact of imagery, and the role of aesthetics as a common driving force across various disciplines. In his view, these elements are crucial to understanding the relationship between these two fields. Additionally, The history of high

energy physics has been reframed by Frank Wilczek as an effort to achieve aesthetic perfection. It seems that the true objectives of science and art are truth and beauty. Remember that G.H. Hardy once said that "A mathematician, like a painter or a poet, is a maker of patterns"? Pauli even goes so far as to suggest that "one should never declare that these laid down by rational formulation are the only possible presuppositions of human reason". There is a world "out there," and each of the sciences and arts creates a distinctive representation of that reality, emphasising the intellectual experience in the case of science and the aesthetic experience in the case of art. affinities between the sciences and the arts.

Our human efforts to comprehend and communicate the world that surrounds us are manifested in both science and art. They have the capacity to transform how we view the world when they are harmoniously combined. And perhaps the most essential thing is that they have the potential to affect our core beliefs. In other words, the results are frequently much more beneficial when artists and scientists work together from the start. It is for this reason that proponents of arts integration



education emphasise how crucial it is for the STEM movement to incorporate the arts.

Fig. 1. Coexistence of art and science

II. TOOL FOR SCIENCE

David Goodsell, a structural biologist at the Scripps Research Institute in La Jolla, California, claims that art has a big impact on science. He claims that visualisation tools help scientists understand their own research and that science is communicated through art. "I've been working on a third aspect," he states. "I develop scientific hypotheses through art. My artwork is geared

towards serving as a tool for science.

How easily crucial facts are captured by outstanding figures can be shown by looking back at the development of scientific figures. For instance, James Watson and Francis Crick's 1953 publication on the structure of DNA is infamous for simply providing a schematic to back up their ground-breaking



assertion.

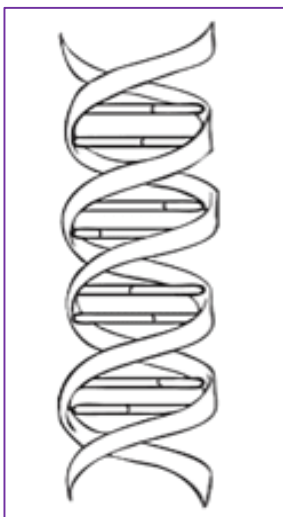
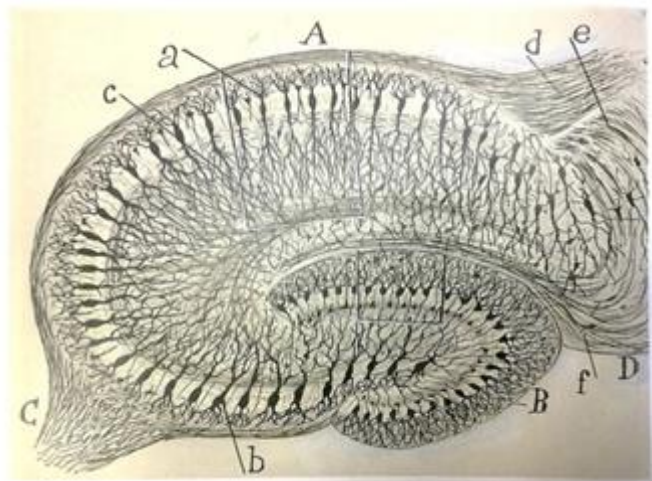


Fig. 2.

The Spanish neuropathologist and neurologist Santiago Ramon Y Cajal examined nervous system cells and brain tissue under a microscope in the 19th century. He received the Noble Prize for these significant scientific findings, which were also depicted in workbooks and on the walls of New York art galleries.. As a result, both scientists and artists are motivated to observe and produce, and they are largely involved in distinct cultural domains.

Fig. 3. (Ramón y Cajal, Santiago (1917) *Recuerdos de mi Vida*. Vol. 2. Fig. 41, p 250. Photoengraving. The principal neuronal types are represented following the description by Golgi and Sala.)

III. RESULT AND DISCUSSION



Art and Science are the two sides of a single coin. Both cannot be separated from each other. In ancient time when the human being interprets the nature and observed the natural phenomenon, and changes of nature, they expressed their thoughts and ideas through some art.

As such their creativity involves imagination which leads to visualization that is done by representation of art.

The two disciplines of art and science work hand in hand since they are both entirely focused on observation and interpretation using scientific data or technological tools like artificial intelligence (AI) and virtual reality (VR) to create art..

Today, our society's relationship between art and science is more nuanced. The intersection of art and science might happen accidentally or on purpose. Science and visual art have a complex interaction that is difficult to sum up. Instead of attempting to generalize, we provide brief insights into their historical and current connections. We also examine the relationship between visual art and science in terms of the tools and processes they use as inputs and the objects they produce and the ideas they communicate. We also offer perspectives on how these two fields relate to one another in terms of these tools and processes. Finally, we suggest ways that society can foster this relationship and potential benefits.

Science and art have coexisted for centuries, frequently becoming one and the same across time and space. Early Islamic cultures combined art and science to create complicated star-shaped architectural geometries, as well as to create utensils and manuscript letters using "Nur" (light) and material science.

Leonardo Da Vinci, an Italian polymath known as "Renaissance Man" and a painter, sculptor, engineer, botanist, and scientist, made significant contributions to the realm of art that communicates scientific concepts throughout the Renaissance. Throughout the 19th century, various western societies separated art from science.

The representation and interpretation of nature served as the foundation for both fields of study. Their techniques eventually diverged, and the scientific school of thinking was primarily influenced by specialisation and hypothesis-based research.

The development of art, on the other hand, led to the emergence of its own schools and methodologies, from classical art, which sought to observe and mimic nature, to the

impressionist, cubist, and expressionism subgenres. There are numerous points where the two converge, both historically and currently.

Despite the lack of cameras throughout the Renaissance, artists created stunning sketches of flora, animals, human anatomy, and glances to express and communicate their observations.

Giving new concepts is essential to together art and science, with surveillance and clarification serving as the foundation. In their book "The Renaissance Print," Peter Parshall and David Landau claim that accurate visual representation was more than just a technical achievement. It was a really specific kind of observation. Making an illustration was a method of verifying information, and by the middle of the 20th century, it was backed by additional methods as well. Herbaria made of collections of dried specimens were being constructed, and plants were being planted for both public and private botanical gardens. The study of herbal and their uses leads to the herbal medicine or ayurvedic medicinal science.

There are several instances of how art and science have coexisted through statement and analysis, from a tangible product that combines the design of an artist and an engineer to an educational visual aid that serves as a statement tool.

Antoni Gaudi used his observations of the organising ideas of nature to be inspired by the geometrical topographies present in nature and to develop the physical structure of the church. La Sagrada Família, which Gaudi designed and started building in Barcelona in 1883, is one of the outstanding illustrations of the world's architectural marvels. Gaudi identified himself as a geometrician, which means that he can combine ideas. This strategy is reproduced in the church's distinctive splitting tree pilasters and stairs with seashell-like curves.

By the 17th century, Maria Sibylla Merian, a naturalist, was using drawings of plants and insects as a form of communication. Her drawings demonstrated how science and art are both components of the same process, and her paintings served as a means of explaining the risky and then unexpected metamorphosis process. Science and art both transform concepts about the world into a format that enables the audience to relate to the concept.

Another significant move in this direction was the establishment of the journal Leonardo, which disseminates research on art and science. Leonardo offers a stimulating academic setting for collaboration and idea sharing between scientists and artists. Art has already become an important curriculum for the medical colleges for their studies the representation of art in the study needs deep observation and interpretation skills which can be helpful to identify the problems to take appropriate decision making to provide better solution in medical science.

In atomic science art representation is much more essential for the study of atomic science. Electrons, protons, neutrons act can be represented in the form of art for better study. The human anatomy, cell division, the structure of blood circulation, different types of organs of the body like brain system, kidney, heart, and all other micro-organs can be represented through art.

To study the electrical science and electrical engineering art representation is highly essential for proper information to

construct the electrical circuit.

In the field of meteorology department of India art is ardently needed to disseminate the climate forecast which plays the vital role to visualize the atmospheric picture/art to inculcate the ideas of the incoming weather to take precaution steps to avoid natural calamities and disasters.

In the field of transport and locomotion art plays an important role to guide the human and goods transport. The ability to comprehend and communicate abstract concepts of a higher order of thought is a crucial component of the current meaning of art and science.

Conclusion

The use of art in transportation and locomotion is crucial for directing the movement of people and things. A crucial aspect of the modern-day understanding of art and science involves the recognition and expression of complex, abstract concepts.

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REFERENCES

- [1] Kemp M (2006) *Seen/unseen: art, science and intuition from Leonardo to the Hubble telescope*. Oxford University Press.
- [2] Mingling art and science opens minds Toni Feder Citation: *Physics Today* 74, 4, 24 (2021); doi: 10.1063/PT.3.4722 View online: <https://doi.org/10.1063/PT.3.4722> View Table of Contents: <https://physicstoday.scitation.org/toc/pto/74/4> Published by the AIP
- [3] *Sculpting Science: An Experiment in Art* Sukant Saran Tata Institute of Fundamental Research, Homi Bhabha Road, Mumbai - 400005, India E-mail: sukant@tifr.res.in
- [4] *Reflections and images: A place for art in medical physics?* Jim Malone School of Medicine, Trinity College Dublin, Dublin, Ireland
- [5] Entire issue: Abbott A, Rutherford A (2005) *Artists on science: Scientist on Art* (Ed.) *Nature* 434:293-293
- [6] Alda A (2017) *If I understand you, would I have this look on my face? my adventures in the art and science relating and communicating.*
- [7] Bullot NJ, Seeley WP, Davies S (2017) *Art and science: a philosophical sketch of their historical complexity and codependence*. *J Aesthet Art Crit* 75:453-463