

Unveiling the Dual Talents: The Artistic Gifts of Renowned Neuroscientists

Revelando os talentos duplos: os dons artísticos de neurocientistas renomados

Art is I; science is we.

Claude Bernard

The greatest scientists are also artists.

Albert Einstein

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SUMMARY

This narrative review approaches four exceptional neuroscientists whose lives embody the convergence of scientific innovation and artistic expression. Jean-Martin Charcot (1825-1893), William Richard Gowers (1845-1915), Harvey Williams Cushing (1869-1939), and Santiago Ramón y Cajal (1852-1934) remain icons in the neurosciences. Not only did these four luminaries make groundbreaking advances in neuroscience, but they also possessed artistic abilities, especially Cajal. Their lives exemplify the harmony between scientific rigor and creative expression. Through their interdisciplinary talents, they illustrated how art and science are inextricably linked, enhancing their scientific endeavors through artistic skills. This article provides insight into the intriguing relationship between the arts and neuroscience, showing how these notable figures leveraged their artistic aptitude to advance scientific communication and understanding.

Keywords: Neuroscientists, Scientific Innovation, Art/history, Medicine in Art, Neurology/History, Interdisciplinary Studies, Creativity

RESUMO

Esta revisão narrativa aborda quatro neurocientistas excepcionais cujas vidas incorporam a convergência entre inovação científica e expressão artística. Jean-Martin Charcot (1825-1893), William Richard Gowers (1845-1915), Harvey Williams Cushing (1869-1939) e Santiago Ramón y Cajal (1852-1934) permanecem como ícones nas neurociências. Esses quatro luminares não apenas fizeram avanços inovadores na neurociência, mas também possuíam habilidades artísticas, especialmente Cajal. As suas vidas exemplificam a harmonia entre o rigor científico e a expressão criativa. Através dos seus talentos interdisciplinares, ilustraram como a arte e a ciência estão intrinsecamente ligadas, melhorando os seus esforços científicos através de competências artísticas. Este artigo dá uma ideia da relação intrigante entre as artes e a neurociência, mostrando como estas figuras notáveis alavancaram a sua aptidão artística para promover a comunicação e a compreensão científica.

Palavras-chave: Neurocientistas, Inovação Científica, Arte/história, Medicina na Arte, Neurologia/história, Estudos Interdisciplinares, Criatividade

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INTRODUCTION

In this article, the 2nd in a seven-part series about neuroaesthetics and visual art, there is the recognition that there is an interconnectedness between art, science, and medicine, showcasing how these disciplines intersect and complement each other. It acknowledges the symbiotic relationship between artistic expression and scientific inquiry, evident in fields like medical illustration and science communication.

The contrasting view points of Claude Bernard's and Albert Einstein's quotes presented at the beginning of this paper on the relationship between art and science offer intriguing insights. Bernard's emphasis on the individualistic nature of art and the collaborative essence of science, 'Art is I; science is we', contrasts Einstein's belief that the greatest scientists possess artistic traits, 'The greatest scientists are also artists'. Yet, they converge on the presence of creativity and imagination bridging these distinct disciplines.

This paper focuses on renowned neuroscientists - Jean-Martin Charcot, William Gowers, Harvey Williams Cushing, and Santiago Ramón y Cajal - and underscores the intersection of art and neuroscience. These figures not only made pivotal contributions to neuroscience but also displayed artistic talents, emphasizing the profound synergy between the two realms. By exploring their lives and work, this paper aims to elucidate the significance of interdisciplinary approaches in scientific exploration and how artistic expression enriches scientific communication and comprehension.

Art and neuroscience

The symbiotic relationship between art and neuroscience, weaving together the perspectives of Semir Zeki⁶, Patrick Cavanagh², and historic neuroscientists who had artistic talents exemplifies the harmony between artistic expression and scientific inquiry.

The parallels drawn between Zeki's concept of 'the artist as neurobiologist' and Cavanagh's idea of 'the artist as neuroscientist' effectively demonstrate the shared exploration of fundamental questions in both fields. Zeki's connection between the artistic endeavors of figures like Mondrian and Cubism with the pursuits of neuroscientists in understanding form constancy and essential shapes showcases the interconnectedness of their inquiries. Besides, highlighting the insights from kinetic artists about visual motion and how it parallels discoveries made by neurobiologists effectively underscores the interdisciplinary nature of art and neuroscience. Moreover, the emphasis on artists manipulating visual cues aligns seamlessly with historical neuroscientists' artistic talents, showcasing their shared pursuit of understanding perception and cognitive processes.

Artistic-Minded Scientists

Jean-Martin Charcot, a distinguished French neurologist regarded as the father of modern neurology, profoundly influenced neurology and psychiatry during his lifetime. Born on November 19, 1825, and passing away on August 16, 1893, Charcot's legacy is steeped in significant contributions to understanding neurological disorders, particularly hysteria and multiple sclerosis, fundamentally advancing the comprehension of these conditions and many others³. Educated at the University of Paris, Charcot received his medical degree before embarking on an illustrious career at the Salpêtrière Hospital in Paris. It was there that he conducted groundbreaking research that would shape the trajectory of neurology. However, Charcot's talents extended beyond the realms of medicine; he was an adept artist, utilizing his artistic prowess to document and illustrate neurological cases. His innovative teaching methods incorporated vivid drawings and engaging performances, revolutionizing medical education. Beyond his medical illustrations, Charcot found artistic expression in various forms, from sketches of colleagues during faculty meetings to landscapes and other subjects¹. Despite his preference for conservative artistic tastes, Charcot's artistic skills were an integral part of his scientific work and, in addition, in 1853, he experimented with hashish in the company of a medical student to understand the effect of this drug. As a result, there was an intense visual hallucinatory state and a design that incorporated elements reminiscent of the surreal and often disturbing landscapes found in the works of artists such as Hieronymus Bosch (Figure 1)¹¹. Consequently, Charcot's artistic finesse, coupled with his scientific acumen, significantly enriched his scientific endeavors, allowing for a unique blend of art and neurology.



Figure 1. Drawing produced under the influence of hashish by Jean-Martin Charcot. <http://www.wikigallery.org/>

William Gowers, a celebrated British neurologist, left an indelible mark on the field of neurology. Born on March 20, 1845, and passing away on May 4, 1915, Gowers is remembered as a distinguished clinical neurologist who significantly advanced the understanding of epilepsy and various other neurological disorders⁴. His clinical descriptions and writings had a profound influence on shaping neurology as a discipline. Gowers received his medical education at University College London and practiced at the esteemed National Hospital for Neurology and Neurosurgery in London. He held various positions at University College London, contributing significantly to the institution. Beyond his contributions to neurology, Gowers' artistic talents were a unique facet of his multifaceted expertise, as he employed his artistic abilities to create meticulous medical illustrations, enriching textbooks and bridging the realms of medicine and art. His seminal work, 'A Manual of Diseases of the Nervous System,' stands as a testament to his proficiency in both medicine and art, playing a pivotal role in disseminating neurological knowledge to a wider audience (Figure 2). Regarding his artistic inclination, MacDonald Critchley noted Gowers' preference for etching and engraving, his delicate and intricate technique in these mediums. Additionally, Gowers utilized pencil drawings, especially for medical and pathological subjects, to illustrate his textbooks. Despite boasting that he never received formal drawing lessons, Gowers diligently studied handbooks on the subject and dedicated himself to practice, showcasing his commitment to refining his artistic skills alongside his medical expertise⁹.

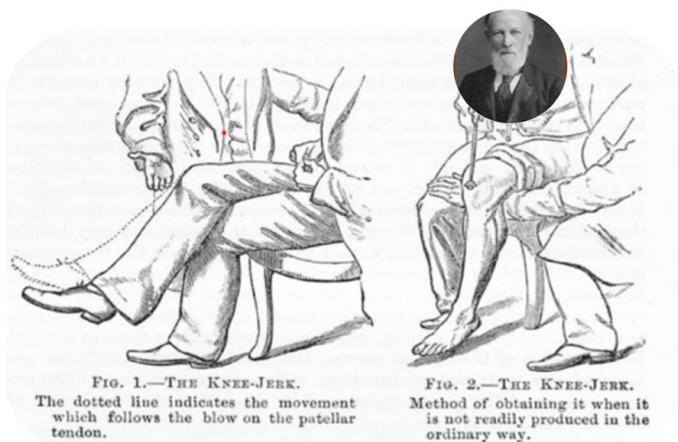


Figure 2. 'Knee Jerk' was drawn by William Richard Gowers for his 'Manual of Diseases of the Nervous System' published by J & A Churchill in 1886. From Wikimedia Commons.

Harvey Williams Cushing, an influential American neurosurgeon, is renowned as the pioneer of modern neurosurgery. Born on April 8, 1869, and passing on October 7, 1939, his transformative contributions reshaped brain surgery techniques, particularly in the realm of brain tumors, notably those involving the pituitary gland^{5,8}. Cushing's groundbreaking innovations profoundly advanced the field of neurosurgery. His educational journey took place at Harvard Medical School, and his professional career

spanned various esteemed institutions, including Johns Hopkins Hospital, Harvard Medical School, and the Peter Bent Brigham Hospital. Beyond his revolutionary surgical techniques, Cushing was notably meticulous in recording his surgical cases. His penchant for detailed documentation extended to creating intricate sketches and diagrams, serving as comprehensive medical illustrations. While recognized for his surgical prowess, Cushing also indulged in artistic pursuits during his leisure time, producing beautiful and intricate landscape paintings. In his admiration, divided with William Osler, for Andreas Vesalius, a pioneering figure in modern anatomy known for his groundbreaking work and illustrations in 'De Humani Corporis Fabrica,' Cushing found a kindred spirit with a shared appreciation for the fusion of science and art. However, it's important to note that Cushing's illustrations primarily aimed at documenting surgeries and anatomical findings, serving as meticulous medical records rather than artistic paintings (Figure 3). Despite this, Cushing's dual talents, bridging medical practice and artistic expression, undoubtedly enriched both his medical endeavors and his artistic pursuits.

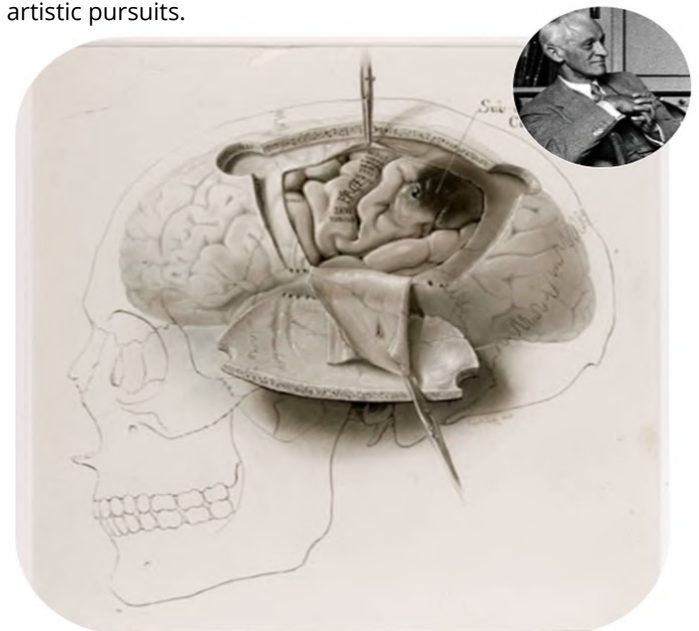


Figure 3. Medical Illustration by Harvey Cushing 1910. From: <http://44377079.weebly.com/cushing-the-artist.html> and Wikipedia.

Santiago Ramón y Cajal, a Spanish histologist, born on May 1, 1852, and died on October 17, 1934, is revered as the father of modern neuroscience through his pivotal work on the nervous system's structure¹⁰. Despite his brilliant scientific career, Cajal was torn between his aptitude for art and his father's insistence that he pursue medicine⁷. Cajal attended the University of Zaragoza for his medical studies where he received his degree in Medicine, and worked at the University of Valencia, where he held professorships and after he was appointed Professor of Histology and Pathological Anatomy in Barcelona, and successively in Madrid, where at the University and his Institute, he conducted his seminal research in neuroscience.

Cajal specifically his discoveries on neuron structure and the 'neuron doctrine', revolutionized the understanding of the nervous system and received the 1906 Nobel Prize, shared with Camillo Golgi (July 7, 1843-January 21, 1926) for Physiology or Medicine for establishing the neuron, or nerve cell, as the basic unit of nervous structure. Cajal stands out as a unique case among these four figures, as he was not only a brilliant neuroscientist but also a talented artist. His drawings are scientifically precise but also immensely eloquent, and famous artists were inspired by his work⁷. He created intricate and detailed drawings of neurons and brain structures through a technique called the Golgi stain, which allowed for the visualization of individual neurons (Figure 4). His drawings are not just scientific illustrations but are also considered artistic masterpieces due to their accuracy, detail, and aesthetic appeal. Cajal's artistic renderings of the brain's cellular structure have been recognized for their scientific significance as well as their artistic merit.

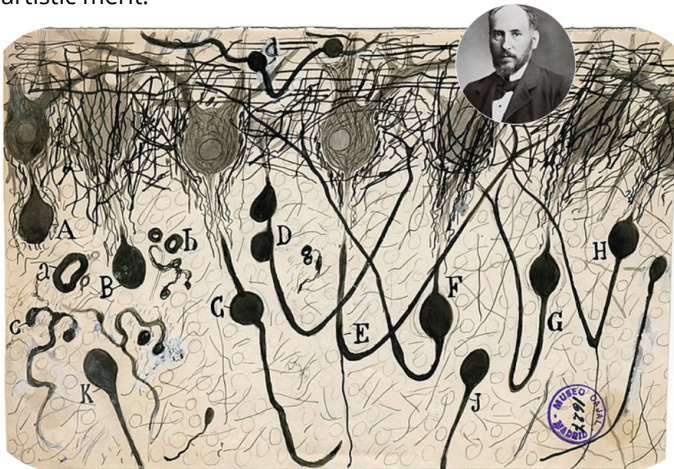


Figure 4. Axon of Purkinje neurons in the cerebellum of a drowned man, c. 1900, Santiago Ramón y Cajal, Cajal Institute (CSIC), Madrid. From Wikimedia Commons.

While Charcot's possible experiences with hashish/painting and Cushing's passion for landscape paintings are interesting aspects of their personal lives, their contributions to neurology and medicine are primarily remembered for their scientific and medical achievements rather than their artistic endeavors.

The enduring legacies of these neuroscientists indeed primarily stem from their groundbreaking contributions to neuroscience and medicine. However, their artistic talents and interests beyond their scientific pursuits highlight the depth of their personalities and the richness that interdisciplinary perspectives bring to scientific inquiry. However, Cajal remains the standout figure among them, renowned for his scientific illustrations that also hold artistic value. Cajal's ability to seamlessly merge scientific accuracy with artistic finesse stands as a testament to the profound impact of combining art and science. His work serves as an inspiration, illustrating how artistic expression can enhance scientific communication and comprehension while leaving a lasting imprint on both fields.

CONCLUSIONS

The intersection of art, science, and medicine is a rich amalgam of interconnected disciplines that complement and reinforce each other. The perspectives of Claude Bernard and Albert Einstein, though seemingly divergent, converge on the idea that creativity and imagination are central in bridging these distinct domains.

Focusing on eminent neuroscientists such as Jean-Martin Charcot, William Gowers, Harvey Williams Cushing, and Santiago Ramón y Cajal accentuates the profound harmony between art and neuroscience. These individuals not only significantly contributed to neuroscience but also showcased artistic talents, mainly Cajal, emphasizing the intrinsic synergy between these realms. Their lives and work serve as compelling examples of the value of interdisciplinary approaches in scientific exploration and highlight how artistic expression enhances scientific communication and comprehension.

The symbiotic relationship between art and neuroscience, as explored through the perspectives of Semir Zeki, Patrick Cavanagh, and historic neuroscientists with artistic talents, exemplifies the seamless blend of artistic expression and scientific inquiry. Zeki's connections between artistic endeavors and neurological pursuits, along with Cavanagh's views on artists as neuroscientists, vividly demonstrate the shared exploration of fundamental questions in both fields. The parallels drawn between artistic insights into visual motion and discoveries made by neurobiologists underscore the interdisciplinary nature of art and neuroscience, emphasizing their mutual quest to understand perception and cognitive processes. This interconnectedness reaffirms the profound links between art and neuroscience, illuminating their collective pursuit of understanding the human mind and perception.

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