

## GUEST EDITORS' NOTE

### Why should science and art engage in dialogue?

How have science and art engaged in dialogue — or confronted each other — down through history? What do these two fields of human culture have in common, and what do they not? Is art nothing more than inconsequential entertainment, as narrow scientificist thinking would at times have us believe? Is science merely an (incomprehensible) threat to culture and humanity, as some artistic manifestos seem to proclaim? How do the concepts, theories, and applications derived from science and technology find a place in the imaginary of artists as a source of inspiration and creativity? To what extent can we find an aesthetic dimension within the work of scientists, and how important is it? At different moments in history, has art been essential to introducing new viewpoints into culture and science? How have the concepts and instruments created or made feasible by science (including the means of communication and the reproducibility of works of art) altered and opened up new pathways for art? How can art help make science more accessible to the lay public, and *visa versa*? Would this constitute a worthwhile, efficacious strategy, or an inappropriate utilitarian appropriation?

Many authors have contemplated the similarities, differences, and (a)symmetries between science and art. These discussions date back to Aristotle, Leonardo da Vinci, William Blake, Johann Wolfgang von Goethe, Victor Hugo, Hermann von Helmholtz, Thomas Huxley, and Werner Heisenberg, among many others. In the twentieth century, the debate stirred great interest, especially after Charles P. Snow's 1959 publication of *The Two Cultures*, which analyzed the separation of the arts and humanities from the sciences. Victor Hugo, for example, underscored the absolute nature of art and the relative nature of science. In the spirit of the nineteenth century, he believed that art does not know the idea of progress, while progress characterizes science. For him, it was the nature of science to negate everything, destroy everything, recreate everything. Progress as the producer of science, and ideals as the producer of art. One scientist makes us forget another scientist; a poet doesn't make us forget another poet.

Along similar lines, in the last century Thomas Kuhn, historian of science, examined the differences between art and science. For him, the greatest difference is that the products of past artistic work remain a vital part of the current artistic scene, whereas science works to destroy its past. Another difference lies in aesthetics: for Kuhn, aesthetics is itself the end purpose of art; in science, it is nothing but a secondary tool, a criterion for choosing between theories or a guide to the imagination. Many important scientists, such as Dirac, would certainly disagree with this statement.

More recently, the physicist and epistemologist Jean-Marc Lévy-Leblond has recognized similarities but also called attention to asymmetries. In his view, what science lacks is a vital component present in all artistic and cultural activities: the critical dimension. Whether referring to a work's aesthetic value or its social significance,

Lévy-Leblond posits that critical distance—a constituent part of artistic modernity—is largely absent from scientific practice. With the pace of publication moving faster and faster, science has little time for internal critical reflection. Missing from contemporary science is a crucial stage of creative activity: taking the time to step back and look at the work as a whole.

Grounded in a vast knowledge of literature and in his own experience as a great fiction writer, Aldous Huxley — following Snow — devoted himself to searching for similarities and to raising arguments against the growing gulf separating artistic and literary culture from science. The historian of science Stillman Drake brought new perspectives to the debate through his studies of the profound ties between music and science, especially at the moment when modern science emerged. Among Brazilians is Mario Schenberg, a scientist and art critic who delved deeply into the common bonds between the two realms. He persistently underscored the presence of aesthetic elements in science, especially in theoretical physics.

More than offering answers to these questions, this special issue of *História, Ciências, Saúde – Manguinhos* is meant to invite you, our readers, to join in the debate on science and art by engaging in a conversation about the interface between the two fields. The assortment of articles, essays, and interviews gathered here are intended to offer you a diversity of outlooks and approaches to this vast topic. The issue is certainly not all-encompassing — nor should it be. Many of the general questions posed above have not been addressed, while others have been explored from specific angles. What we do offer you is a collection of works by national and international authors who ponder the concrete similarities and asymmetries between science and art. We hope these writings will arouse your interest in further reflection on the topic, and that they will contribute to the dialogue between science and art.

This dialogue could not leave out science fiction. Historian Ciro Flamarion Cardoso calls our attention to the late-1990s release of such films as *Dark City* and *Matrix*, where the world in which the characters live is eventually revealed to be a fake one that involves the manipulation of individual freedom. Starting from the presupposition that science fiction is “thought experiment,” Cardoso asks why this has become such a popular topic.

The educators Andreia Guerra, José Claudio Reis, and Marco Braga present an overview of the relations between the realms science and art, especially between physics and painting, from the scientific revolution of the sixteenth and seventeenth centuries through the twentieth century. Fayga Ostrower’s contributions on time and space in art and science are also examined, in a text based on interviews and on documents kindly provided by her family. This is our tribute to an extraordinary artist and thinker, who passed away in 2001.

The physicist João Zanetic draws a bridge between his science and literature, arguing that such a link affords a useful way of interpreting the world. He discusses how the shift from a worldview influenced by classic physics to one born with contemporary physics had an influence on literary writing, as exemplified in the works of Edgar Allan Poe, Gustave Flaubert, Emile Zola, Augusto Zaluar, Fyodor Dostoyevsky, and William Faulkner.

Likewise in the field of literature, the Brazilians Affonso Romano de Sant’Anna and Marco Lucchesi discuss their relations to science and how it has influenced poets,

*cronistas* (writers of short-short stories), and essayists. They reveal an interesting facet of this interaction when they cite poems that they themselves wrote under the inspiration of science texts. Izabela Furtado comments on what she feels to be a most significant facet of Goethe: his comprehensive research into scientific topics, found in a number of his works.

Samuel Edgerton investigates another fascinating issue: how science has benefited from art. According to this historian of science, the linear perspective used by Filippo Brunelleschi in the fifteenth century, in which geometric rules were applied to reflections in mirrors, was more than an artistic event; it had an intrinsic relation with the emergence of modern science. Edgerton contends that without the artistic awareness of perspective, Galileo most certainly would not have been able to describe the moon's surface in 1609, when his observation of it through the newly invented telescope had an astounding impact on our cosmological view.

Three articles explore a journey to the imaginary of filmmakers and musicians and how they investigate the topics of science and technology. Jefferson de Oliveira looks at links between science and film: the use of movies as a tool of observation, as teaching material in science education, and especially as a means of expressing and shaping the social imaginary of science. In an analysis of how the big screen has portrayed human cloning, Craig Cormick pinpoints the main messages that movies convey to the public at large, taking as his point of departure the fact that this medium provides one of the prime sources of information on the topic. Ildeu de Castro Moreira and Luisa Massarani identify a number of composers from the Brazilian musical genre known as MPB who drew inspiration from science and technology when they wrote their lyrics.

The philosopher Francisco Ortega analyzes how courtrooms and popular culture — especially literature, film, and magazines — are viewing the medical technologies currently available for imaging the inside of the human body.

In the area of theater, the actor Carlos Palma recounts his experience as head of the “Arte e Ciência no Palco” project, which since 1998 has been staging plays centered around the theme of science.

A parallel between the life and work of Einstein and Picasso is the intriguing topic of historian of science Arthur Miller. Both produced their most important work during the same period: Einstein formulated his Theory of Special Relativity in 1905 and Picasso painted “Les Demoiselles D’Avignon” in 1907. Miller shows us how the relations between these works go well beyond mere temporal coincidence. Another icon of world art, Salvador Dalí, is the subject matter taken up by journalist Mònica López Ferrado, who examines the eccentric artist’s interest in science and in topics like the atom bomb and the uncovering of the structure of DNA.

Using physics to help understand Jackson Pollock’s aesthetic, Richard Taylor offers his thoughts on the US artist’s fractal paintings. The bioartist Eduardo Kak discusses the relation between science, technology, and contemporary art. He turns to his own work, in which he investigates the poetics of life and of evolution, experimenting with biological materials and making references to controversial genetic engineering techniques — as in the green fluorescent rabbit called the “GFP Bunny.”

Do the articles in this issue of *História, Ciências, Saúde – Manguinhos* suggest a reduction, a submission, or even a forced reconciliation between the fields of science and art? We don’t think so. The primary function of the arts is not to explain, or ‘help’,

the sciences, nor is the role of the sciences to clarify the arts. Art may be instrumental to science but not as a pedagogical crutch: it can make its human content clearer and can contribute to the construction of a critical dimension. Science, on the other hand, plays an ever more decisive role in the survival of humanity; if properly used, it can make a notable contribution to renewing the elements of artistic endeavor, and also serve as a source of inspiration for further creations.

Science and art: both feed from the same humus — human curiosity, creativity, the desire to experiment. Both are conditioned by their history and their context. Both are immersed in culture, but they imagine and act on the world from different perspectives, with different goals, and through different means. Artistic endeavor and scientific endeavor are two facets of human action and thought — complementary yet fraught with tensions and variances. From this relation may spring something new, mutual enhancement, and humanistic affirmation.

*Vive la similarité! Vive la difference!*

*Luisa Massarani, Ildeu de Castro Moreira, and Carla Almeida*  
Guest editors