Photo: Wikimedia Commons.

Regenerative Reliquary, 2016. (3-D printed sculpure of hand/bioprinted microscopically out of pegda hydrogel).

The Imagination: Where Art and Science Meet

Jorge Reynoso Pohlenz*

In his short story "The Exiles" (1949), Ray Bradbury describes a relatively near future in which Edgar Allan Poe lives in off-world exile with other great authors of fiction and their imaginary creatures, among them, the witches from *Macbeth*. While the literati and their fearful fantasies lament their increasingly tenuous existence, an interplanetary flight crew experiences nightmares, hallucinations, and unexplained deaths for the first time. Their ship is transporting strange relics: books that, despite not having been read in almost a century and being alien to a global rationalist culture that condemns superstitions, are the cause of terrors and disquiet. All of the latter disappear when the books are consigned to a bonfire . . . , something that also definitively snuffs out the ghosts of Poe and his companions.

Bradbury allegorical premonition did not turn out to be very precise. While the technological application of scientific development has grown throughout our lives and is more and more intimately linked to them, fantasy and horror literature continues to prosper, as do its derivatives in other media. It would even be devoutly to be wished that the popular dissemination of science had a media presence comparable to that of fantasy fiction or the huge influence of science itself in our development. However, despite the fact that the premonitory content of the story of a future devoid of fantasies is out of date, what continues to exist is a concern that has haunted the imagination of many since causal determinism was proposed as an implicit component of scientific progress.

A couple of research projects in recent years that involve art works can illustrate this concern a little more. Lior Shamir, a computer scientist from Lawrence Technological University, has developed an algorithm based on the analysis of abstract expressionist painter Jackson Pollock's work. This algorithm can not only identify to a high degree of certainty the authenticity of Pollock's work, but can also replicate it.

Parallel to this, Alex Forsythe, a psychologist from the University of Liverpool, has collaborated with specialists in fractal geometry to study the late work of Arshile Gorky and other painters afflicted with mental deterioration, seeking to identify patterns that help us understand diseases like Alzheimer's from a non-linguistic perspec-

* Professor of art theory and history at the La Esmeralda National School of Painting, Sculpture, and Engraving (ENPEG) and the Center for Design, Cinema, and TV; curator of modern and contemporary art; and cultural promoter at the National Fund for Culture and the Arts (Fonca); manfredo.jorge@gmail.com.

The very personal, complex work of artists like Pollock or Gorky can be analyzed and predicted just as our tastes and aspirations can, processed by social network platforms' algorithmic systems.

tive. Shamir's and Forsythe's publications have been both applauded and debated by different scientific communities, showing that the pioneering terrain of science is rough going and unanimous scientific consensus is by no means easily arrived at. However, from the viewpoint of a non-specialist, both studies suggest that the very personal, complex work of artists like Pollock or Gorky can be analyzed and predicted just as our tastes and aspirations can, processed by social network platforms' algorithmic systems. At the same time, we suspect that some of the current musical hits are not the product of a composer, but were made by machines fed by the statistical variation between consumption and taste.

We ought to regard the present state of the universe as the effect of its antecedent state and as the cause of the state that is to follow. An intelligence knowing all the forces acting in nature at a given instant, as well as the momentary positions of all things in the universe, would be able to comprehend in one single formula the motions of the largest bodies as well as the lightest atoms in the world; provided that its intellect were sufficiently powerful to subject all data to analysis; to it, nothing would be uncertain; the future as well as the past would be the present in its eyes.[1]

This description on the bases of causal determinism by Pierre-Simon Laplace (1749-1827) can be interpreted as the beginning of a human adventure. But it can also be understood as the declaration of a valiant advance of rationalism into the territory of uncertainty, in which the death of superstition is considered a justified execution, and the undermining of fantasy just collateral damage. But finally, its main victims are subjectivity and free will.

Admitting that an unequivocal objective of science is to follow a process to make reality more intelligible, we would not necessarily have to see determinism as something that reduces the territory of the subjective imagination. Toward the end of the sixteenth century, at the time when the bases for the scientific method were being consolidated, thinkers like Giordano Bruno and Francis

Art, Science, and Technology at the UNAM*

In 2018, the National Autonomous University of Mexico and the Ministry of Culture launched an initiative to stimulate the dialogue, exchange, and collaboration among science, the arts, and the humanities in Mexico. The aim was to connect areas of knowledge to deliver research results to broader audiences and to publicize existing artistic and scientific treasures and foster collaborative efforts.

The Art, Science, and Technology (ACT) Project is a platform for consolidating and fostering research projects and multi- and inter-disciplinary production, strengthening the creation of artistic-scientific works, and fostering cultural policies to encourage and disseminate projects linked to this kind of topic.

The ACT Program has four axes for action:

- A call for production, research, and dissemination
- An International Conference on Art, Science, and Technology
- Launching projects
- Publications

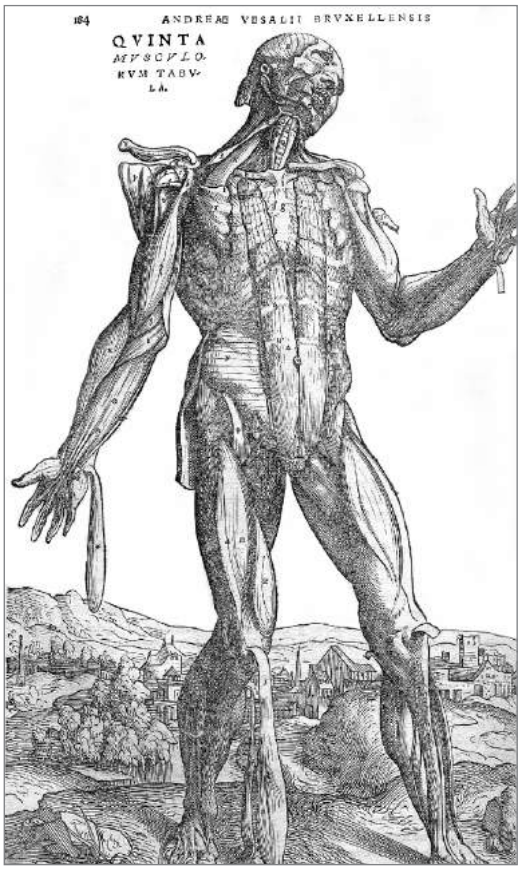
Some of the actions that have already been carried out include

- live coding and registry of deep space sounds;
- artistic conceptualizations of anti-matter;
- projects to build bridges between science and science fiction;
- a series of lectures and round table discussions about the links between neuroscience and the performing arts and their possibilities;
- an international colloquium about notation;
- overlapping and contemporary practices in a dialogue between Latin America and Europe;
- the Zero Degree Seminar and theoretical-practical art and science interventions;
- Festival N, Art, Science, and Technology, made up of an international collective exhibit, "Spaces of Species"; the international TTT (Taboo, Transgression, and Transcendence) Congress; and the LabCet Laboratory of Transdisciplinary Performing Creation.

Festival N is an initiative of Art+Science (UNAM) and Bioscénica, with special support from Cultivamos Culture (Let's Cultivate Culture) (Portugal), to exhibit the knowledge of different international bodies and collectives, led mainly by women, that work on the intersection of art, science, and philosophy in the academic and artistic spheres, in a festival format that will be presented in the Digital Culture Center and the UNAM as part of the theme of epigenetics and multiple spatialities.

Bacon did not understand the vistas opened up by the development of science as shrinkage, but as a spectacle offered to the imagination of the size of the universe. With our nature, keen on contradictions and dichotomies, we are intimidated by the possibility that Pollock's apparently irrational work could be algorithmically predictable, but we are inspired by a future in which seismic movements could be systematically anticipated.

On the other hand, the idea that the meaningful value of art lies in subjective talent is relative new, modern. It emerged at the same time as the process of consolidation of the scientific perspective as a valid, authorized way of interpreting the world and its use as a technological application, as well as the recognition of science in modernity, which is why it began to identify the creator of art as an individual genius, whose work tended to be freed from its functions as a representation of the divine and secular powers. Ancient Greek sculptors like Phidias or Praxiteles would have been overjoyed with the proposition that their creations corresponded to universal, general, regular principles, distilling from them a formal economy inscribed in nature and that could be fitted to a harmonious progression of numerical reasons. The recognition of the ancient artists was not based on the inimitable originality of their creations, but in those works' ability to represent common values and serve as models to be imitated. Originality was a privilege, a gift offered by the muse: the artist was possessed, a mediator in whom dwelled a transpersonal genius. Some promoters of the existence of harmony between art and science dodge Plato and Aristotle's reservations about art's morally perturbing power and concentrate on the formal harmony of the Greek and Roman visual arts to propose an ancient sympathy manifested in proportional relations and the correspondence between the micro- and macro-cosmic. That is to say, a dialogue between a rational soul and the beautiful form of the senses, good, and the seed of wisdom that was preserved in medieval scholasticism and would reemerge freed of theology in the Renaissance: the pre-Socratic philosopher Empedocles's Eros, supplanted first by Divine Grace and later demystified under the name of Nature or Reason. In this cordial understanding of art and science, Leonardo da Vinci's sketch is presented as an emblem that restores a past that projects into the future. While Da Vinci and his work comfortably adjust to the imaginary of the meeting between art and science, we must

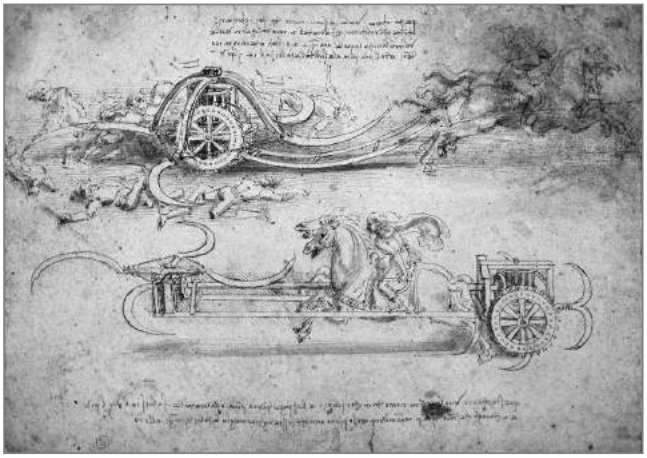


Andreas Vesalius, *De humani Corporis Fabrica.*

remember that this Tuscan genius was also the author of experiments gone wrong, the actor in and witness to power games, the man who suffered in terrible wars, and the architect of death machines. In the illustrated chapter on the Renaissance in the story of modernity, the *Vitruvian Man* rubs elbows with Andreas Vesalius's treatise on anatomy, graphics of bodies cut apart by the new military technologies, and cannibal festivities in the West Indies.

Beyond the diversity of its fields of study and the variety of its applications and technological innovations, in the last four centuries, science has refined a methodology and a system of certification that are common to all its activities and are essentially alien to the practice of art and its cultural validation. We could even propose the

The development of the sciences and the emancipation of the arts are essential components along a road toward the realization of humanity.



Leonardo da Vinci, *Studi di carri d'assalto falcati.*

idea that, in modernity, art has become a territory partially defined that harbors heterogeneous forms of expression and aesthetic experience that it has not been possible to incorporate into other spheres of human endeavor and that tend necessarily to disciplinary confusion and indiscipline. With its great capability to cover all things, science may orient its field of study toward art, just as the practitioners of art can resort to science as a theme and to the most recent technologies derived from scientific development; but the conceptual differences between art and science make an exercise of equivalencies impossible: nothing forces them to commitments, to convergences or divergences, conspiracies or antagonisms.

We could, however, propose a basic divergence: the artistic experience is obliged to manifest itself as a phenomenon accessible to the senses. A Euclidian geometric proposition can last beyond the sand, the wax, the parchment, or the blackboard on which it has been drawn to explain or demonstrate it. Art, on the other hand, is conditioned to its supports, portability or mobility, to scales, to what is lost and won in interpretation, to novelty or decrepitude, to the state of the weather or the affects. While the scope and validity of a scientific law are subjected to its periodic proof in light of new observations, that law aspires to universality, to the coherence and impersonal unconditional character of its proposition in any place and time, within the parameters that it enunciates. For its part, the work of art shows, as Ortega y Gasset points out, an intimate solidarity with the historic moment in which it was created; this solidarity is so close that we identify what we suppose are the most eloquent remnants of a culture from the past as artistic. What we conceive of as universal or lasting art consists of the re-creation, re-interpretation, or re-contextualization of a work from another time or place to give it meaning today or to give an updated sensorial representation to cultures of the distant past or that are far removed.

Among the common points of art and science as co-inhabitants of modernity, one is very important: both have the ability to contravene common sense, dogma, and convention. Shakespeare's agnostic, existentialist, and fatalistic soliloquies in *Hamlet*, *Macbeth*, and *King Lear* debuted very nearly at the same time as Francis Bacon's pioneering technical-scientific program, while Laplace was a full contemporary of Francisco de Goya, a painter whose sympathy for the Enlightenment did not prevent him from violating the conventions of beauty and disturbingly portraying both heretics and nightmares of the dream of reason and the disasters of a war motivated by Napoleon, Laplace's patron. For its part, certain formulations and verified models of science have distanced themselves counter-intuitively so much from day-to-day conventions and experiences that, when scientists want to disseminate them to a non-specialized public, they have to resort to the metaphors of fables, myths, and poetry, from the cosmography of Hinduism to the sub-atomic strings whose vibrations weave the texture of the universe: the reflection and representation of reality requires an enormous exercise of the imagination. The development of the sciences and the emancipation of the arts are essential components along a road toward the realization of humanity, interpreted as a group of beings increasingly conscious and free. We cannot blame science for the shrinking space for the imagination, but rather, a system that appropriates rationalism shored up by technocracy, reducing the dimensions and relationships we establish with the world, and, in order to do so, inhibiting both access to knowledge, understood as diversity, plurality, and skepticism, and the spaces for experiencing and practicing the arts, which, in their conditions as exiles, are the hosts for some very uncomfortable, but fabulous, heretical beasts. VM

Notes

1 https://www.goodreads.com/author/quotes/324846.Pierre_Simon_Laplace.

* The source for the information in this article is http://artecienciaytecnologias.mx/es/inicio.