

Marcelo Velasco
Ignacio Nieto

The Art-Science Symbiosis

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Cover Illustration: Francois-Joseph Lapointe. 2016. From the series *Microbiome Selfie. 1000 Handshakes*. This image exhibits the extensive microbiome resulting from the analysis of the samples collected after 650 handshakes. ArtLaboratory. Berlin, Germany © François-Joseph Lapointe, 2016.

“1000 Handshakes” is a performance piece during which the artist shakes hands with as many people as possible, gradually changing the invisible microbial community in the palm of his hand. Periodically, assistants take a swab from the skin, and the samples are analysed in the lab to reveal how our contact with others shapes the microbes between us. This ongoing project has been performed in different cities around the world (including Copenhagen, Montreal, San Francisco, Perth, Berlin, Baltimore and Paris) as a way to map our collective microbiome using scientific data. Production of the “microbiome selfies” involved many different steps. Following the collection of the microbiome samples, bacterial DNA was extracted, amplified and sequenced to create the bioinformatic data shown in this series. The nodes of the networks represent bacterial DNA sequences, and two nodes are connected by an edge (line) when the bacterial DNA sequences have more than 95% similarity. The different colours correspond to distinct samples collected at every 50th handshake, from 0 to 1001.

*To Ivan, Sonia, Lucia, Chony, Pato, Andrés, Paula, Reinaldo
and Pascuala, my beloved family.*

—Marcelo Velasco

*To my mother Carmen Luz, who gave me the opportunity
to write it down.*

—Ignacio Nieto

Foreword

Especially since the beginning of the twenty-first century, there has been a broad debate about how art and science (and especially artists and scientists) should enter into dialogue and constructively engage with each other. Historically, this has been a problematic process, fostered by a genuine interest in structurally different approaches and languages and at the same time systematically burdened by the temptation to subordinate the respective counterpart. More generally, I could argue that the difficult dialogue between the protagonists of science and the humanities, where the respective boundaries have often created a counterproductive and insurmountable intellectual competition, is somehow sublimated.

Velasco and Nieto are a rare example of systematic intellectuals who unite science and art in their writings and practices and have been engaged in such a conversation for years, which has been gradually transformed into a methodological approach in this book. Both operate in Santiago de Chile, geographically on the fringes of the contemporary art market and major science funders, and yet have deeply probed original and radical intersections of art and science that are reflected in as many artworks.

The book seems informed by their conversations and curatorial stance. The authors co-authored the first two chapters, which provide a comprehensive overview of the founding principles they articulated. They then selected 22 artworks that represent, on different levels, the integration of art and science in a single work. They all reflect an original balance between the two fields and involve a range of scientific disciplines. The protagonists' descriptions of the projects are also linked to an analysis of their insights.

This work articulates in itself what the authors define as “a third way in the creation of knowledge” and proves how the methodology applied can be successfully applied to a variety of scientific fields without violating its principles.

Dialogue, as one of the supreme tools that we still have at our disposal to collectively and effectively discuss the big questions of our existence, requires constant negotiation, or what the authors brilliantly define as ‘inter-influence’. The precarious ‘symmetry’ in the selected works and the effort to maintain an inherent balance forms a cultural value in itself, which is consolidated through the same selection.

It is hoped that the dialogue developed by the authors will continue through the artworks and eventually extend to the readers, especially those involved in these fields, to start a virtuous process of cultural interinfluence.

Dr. Alessandro Ludovico
Associate Professor in Art Design
and Media, Winchester School of Art
University of Southampton
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Chief editor,
Neural magazine www.neural.it

Preface

Many of the ideas presented in this book come from our own practice as mediators and promoters of art-science works, mainly among scientists. We learned a great deal from the talented art-scientists involved in the project, from their experiences and artworks. Choosing and obtaining the relevant images allowed us to contact people as interesting and generous as they are enthusiastic.

More than an attempt to provide answers to very specific questions, this book presents the diversity and breadth of art-science integration and offers a framework to analyse these and promote the wider discussion of ways this integration might contribute to form new types of knowledge. While the proposed framework does provide limits and definition to the diversity of art-science works, it is intended more as a heuristic tool than a rigid structure, as we acknowledge having left out some elements and fields such as sound art, architecture and design, each with a robust tradition of its own. The rewarding experience of communication with the talented exponents of art-science who participated in this book, nonetheless, confirms our belief in the value of dialogue among artists and scientists.

This book was written without financial support nor ties of affiliation, a circumstance which gave us independence and freed us from external pressures and institutional purposes.

The Art-Science Symbiosis is motivated by our own personal experiences in and curiosity about art-science integration to which we come equipped with somewhat different perspectives. One of us, Marcelo Velasco, is rooted in Neuroscience, Ecological Economics and Medial Arts, while the other, Ignacio Nieto, is more at home in the Visual Arts, Education and Aesthetics. The reader will easily find signs of these disciplinary perspectives in the pages of this book.

The book was written in Santiago-Chile, in a friendly language and intended for scientists, but without a doubt it can be useful for artists, post-graduate students in science or humanities or by anyone interested in the subject. We would be delighted to be contacted by the readers to continue this discussion with all those who are interested in learning about and developing outstanding art-science challenges. Website: www.artscience-symbiosis.net

Santiago, Chile

Marcelo Velasco
Ignacio Nieto

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We are grateful to many people and organisations for allowing us to use the images displayed in this book including Robert Pepperell, Artist and Professor of Cardiff School of Art and Design, as well as Ionat Zurr and Oron Catts, from SymbioticA, Centre of Excellence in Biological Arts; to Justyna Niewiara, Archivist of the Richard Deacon artwork; Dr. Luise Reitstätter, Cultural Scientist from CReA Laboratory for Cognitive Research in Art History at the University of Heidelberg of the Art; Zoya Dare, also from CReA; to Mariana Arellano at Fundación Engel; to Jungyeon Park from Studio Locus, South Korea; to Dave Furness, Professor Emeritus of Cellular Neuroscience, Keele University; to Ph.D. Anne Rothfeld, from the National Library of Medicine.

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illustrations; and Martin Hieslmair from the Corporate Communications/ Web Department associated to the Ars Electronica.

We also want to deeply thank the 22 interviewees, renowned artists and scientists from around the world, for providing us not only with contextual descriptions of their art-science work, but also technical information, theoretical insight and, crucially, permission to publish their images: Jean-Baptiste Boulé, Nicolas Desprat and Philippe Parreno; Dmitry Bulatov and Alexey Chebykin; Juan M. Castro and the Proto-Alien Project; Shanthi Chandrasekar; Suzanne Dikker, Matthias Oostrik and Suzan Tunca; Gilberto Esparza; David Goodsell; Kathy High; Yunchul Kim; François-Joseph Lapointe and Marianne Cloutier; Max Liboiron; Rachel Mayeri; Andro Montoya Riveros; Špela Petrič; Perdita Phillips; Jimena Royo-Letelier, Pierre Berger and Vincent Martial; Michail Rybakov; Susana Soares; Daina Taimina; Manuel Théry; and Paul Vanouse and Nicholas Wade.

Last but not least, all our gratitude goes to Gonzalo Cordova for his patience and confidence in this project, to Jayanthi Narayan and to Mimi Bick, for her enormous and generous work as Editor, Advisor and English Corrector.

About This Book

This book delves into the long-standing human aspiration to integrate art and science. In six chapters, *The Art-Science Symbiosis* outlines new approaches to understand current scientific practice in general and art-science in particular, showcasing how contemporary art can provide a unique perspective on the meaning and potential of interdisciplinary collaboration. With more than a hundred full colour images, *The Art-Science Symbiosis* may serve as a resource for those interested in researching on and applying the art-science integration, as well as a general reference for anyone interested in interdisciplinary and transdisciplinary work.

In the book, 22 artworks have been selected based on their inherent merits and for the emergent knowledge that their art-science integration produces. These works have sparked novel questions, ideas and curiosity among scientists and artists alike which, we hope, will promote further dialogue not only among them but with the general public, inspiring a process that may lead to diverse, complex and promising results with real-world consequences we have as yet to uncover. The key issues of the book are:

- Contemporary art is a powerful space of dialogue between science and the public.
- Interdisciplinary collaborations should be symmetrical and collaborative.
- Artistic inquiry can lead to new understanding of scientific exploration.
- Art-science has a strong transformation potential.
- The arts and the sciences are human expressions that anyone can explore.

Art-scientists contributing with their artworks

Jean-Baptiste Boulé, Nicolas Desprat and Philippe Parreno

Pierre Berger, Jimena Royo-Letelier and Vincent Martial

Dmitry Bulatov and Alexey Chebykin

Shanthi Chandrasekar

Suzanne Dikker, Matthias Oostrik, Suzan Tunca, and Than Van Nispen

Gilberto Esparza

David Goodsell

Kathy High

Yunchul Kim

François-Joseph Lapointe and Marianne Cloutier
Max Liboiron
Rachel Mayeri
Andro Montoya Riveros
Špela Petrič
Perdita Phillips
Juan M. Castro and the Proto-Alien Project
Michail Rybakov
Susana Soares
Daina Taimina
Manuel Théry
Paul Vanouse
Nicholas Wade

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About the Authors

Marcelo Velasco (Santiago, 1971) is a biologist with graduate studies in Medial Arts (Universidad de Chile) and Ecological Economics (Universitat Autònoma de Barcelona). As an experimental biologist, he worked in Neurosciences studying the epistemology, physiology and behaviour of the visual system and magnetic perception. During the 2000s, he developed studies for the sustainability performance of various industries. He has developed and applied innovative social instruments for collaboration and inclusion using new technologies and interdisciplinary approaches. This and other works resulted in presentations in Argentina, Colombia, Canada, the UK and throughout Chile. Currently, he is devoted to unfolding the transformative potential of art-science inside and outside the scientific community.

Ignacio Nieto (Santiago, 1973) studied Fine Arts, has a Masters in Educational Informatics and is currently a Ph.D. candidate in Philosophy with a specialisation in Aesthetics and Art Theory at the Universidad de Chile. For the last 15 years he has worked in several Chilean universities, teaching object-oriented programming to design and art students, making expositions, and as a curator, giving lectures and workshops on new media. His proposals have been presented in different places in Chile and in different countries: Argentina, Brazil, Colombia, Mexico, USA, Switzerland and the Netherlands. He has also been a juror for the Apex Art Gallery in New York, the Symposium for Electronic Arts, ISEA, and guest editor of the journal *AI and Society*. He is currently completing his doctoral thesis, based on the representations that take into account, in the art practice.

Introduction to the Art-Science Symbiosis

1

Abstract

This introductory Chapter depicts the authors' motivations in writing this book, describes its structure and briefly outlines the objectives, premises, borders and expectations assumed in this interdisciplinary endeavour. Some basic qualitative differences that are found in works of art-science integration or symbiosis are identified, as are the basic assumptions underlying the approach chosen by the authors.

Keywords

Art-science · Art-scientists · Interdisciplinarity · Science communication

This book delves into the long-standing human aspiration to integrate art and science and proposes new possibilities for their harmonious coexistence. Through a review of art-science works, it showcases how contemporary art can provide a unique perspective on cutting-edge scientific research, exploring the intersection of art and science across different historical periods, contexts, and purposes, highlighting the meaning and potential of interdisciplinary collaboration. We have been trained and are

immersed in both fields, with backgrounds in biology, neuroscience, medial arts, visual arts, programming, education, and philosophy. We challenge each other to approach the subject from diverse perspectives and share our enthusiasm for exploring, deepening, and pushing the boundaries of this integration.

The goal of *Art-Science Symbiosis* is to serve as a resource for researchers interested in interdisciplinary and transdisciplinary work that bridges the fields of art and science, as well as a general reference for anyone interested in the topic. Due to the complexity and breadth of artistic expressions, this publication focuses solely on the visual arts, involving the production and exhibition of objects created using various techniques.

The study of art-science integration through analytical approaches has received little academic exploration. However, there is a significant body of literature, exhibitions, and biennials that focus on the relationship between art and technology, which is often confused with the art-science relationship. To differentiate between the two, we may understand the art-science relationship here closer to “art and basic science”, where technology is a means of advancing knowledge without treating art as just a tool for applied scientific procedures.

As students and then practitioners of art, we have noticed that many artists are interested in scientific topics and techniques. These interests

often influence the development and proposals of their artistic works. We have also observed that scientists are often unfamiliar with the cultural and philosophical implications associated with the premises of contemporary art and with questions surrounding positivism (the so-called “crisis of modernity”), an important topic of reflection in the twenty-first century. These observations led us to wonder whether art too can have an impact on science and if so, whether it can make a valuable contribution to scientific inquiry.

In general, art-science works stand out for their artistic merit, yet contributing little to the scientific field that informs them. In other cases, the work harnesses artistic skills solely for scientific purposes. In both cases, either science or art held greater authority, defining the scope of the integration and creating a hierarchical relationship that served the disciplinary purposes of the dominant field. Our training in art and science allowed us to bring a double sensitivity to what we encountered. Thus, the most strong inspiration came with artworks that captured our attention for both artistic and scientific merits, but also by the emergent knowledge that the art-science integration produced. These works existed in an intriguing intermediate zone, where the authority of art and science was notably symmetrical and their mutual influence visible.

Initially, the search focused on symmetrical works created by professional artists who incorporated science into their practice. However, our search yielded some fortunate findings, leading us to expand its scope to include works created by professional scientists integrating contemporary art into their scientific practice. When scientists integrate the arts and the sciences in a symmetrical way, they expose themselves to new audiences, new questions and critical viewpoints, placing them on a more horizontal plane in relation to the public, as discussed by Born and Barry (2010). They spark new questions, ideas and curiosity among scientists, artists, and the public, facilitating the crucial dialogue that addresses the complex relationship between subjective perspectives, emotional experiences

and objectivity. In this approach the subjective choices made by scientists in the selection of research questions or forms of capturing evidence are made more visible.

For artists, a symmetrical integration allows for expanded objectual possibilities and meanings, leading to complex visual devices. Experimental science forces artists to consider empirical constraints to their projects, for example, in terms of the replicability or the explanatory power of the proposal. By breaking down the barriers between the sciences and arts, we may discover new and enigmatic paths that lead to diverse, complex, and promising results with real-world consequences that we have yet to uncover.

In choosing works for this book in a process akin to a curatorship in the world of art,¹ we resort to various conceptual criteria, including: relevant integration; mutual transformation; scientific disruption through art; the poetics of science; art and objectivity. We have selected 22 splendid works that embody a virtuous symbiosis of art and science, which are presented in Chap. 4. All of them challenge both art and science while addressing specific issues like learning, identity, excessive material growth, or our coexistence with the natural and the artificial.

This selection process raised many further complex questions: Is it possible to propose criteria that links or values these works as an artistic movement? Can we assess the contribution to science of these proposals and research perspectives? What specific role does art and science play in each work and ultimately what is the epistemological status of these hybrids? How and what can we learn from the knowledge that emerges from these interdisciplinary operations and mutual transformations? It is important to warn the reader that this book does not aim to provide thorough answers to these questions. Rather, it seeks to make them explicit by linking them to functional theoretical proposals which advance an open and timely dialogue between

¹*Curatorship* is the process of making “decisions about which works of art should be displayed and how they should be seen. They also decide on the themes and ideas to be experienced by the audience.” (AGSA 2023, parr 4).