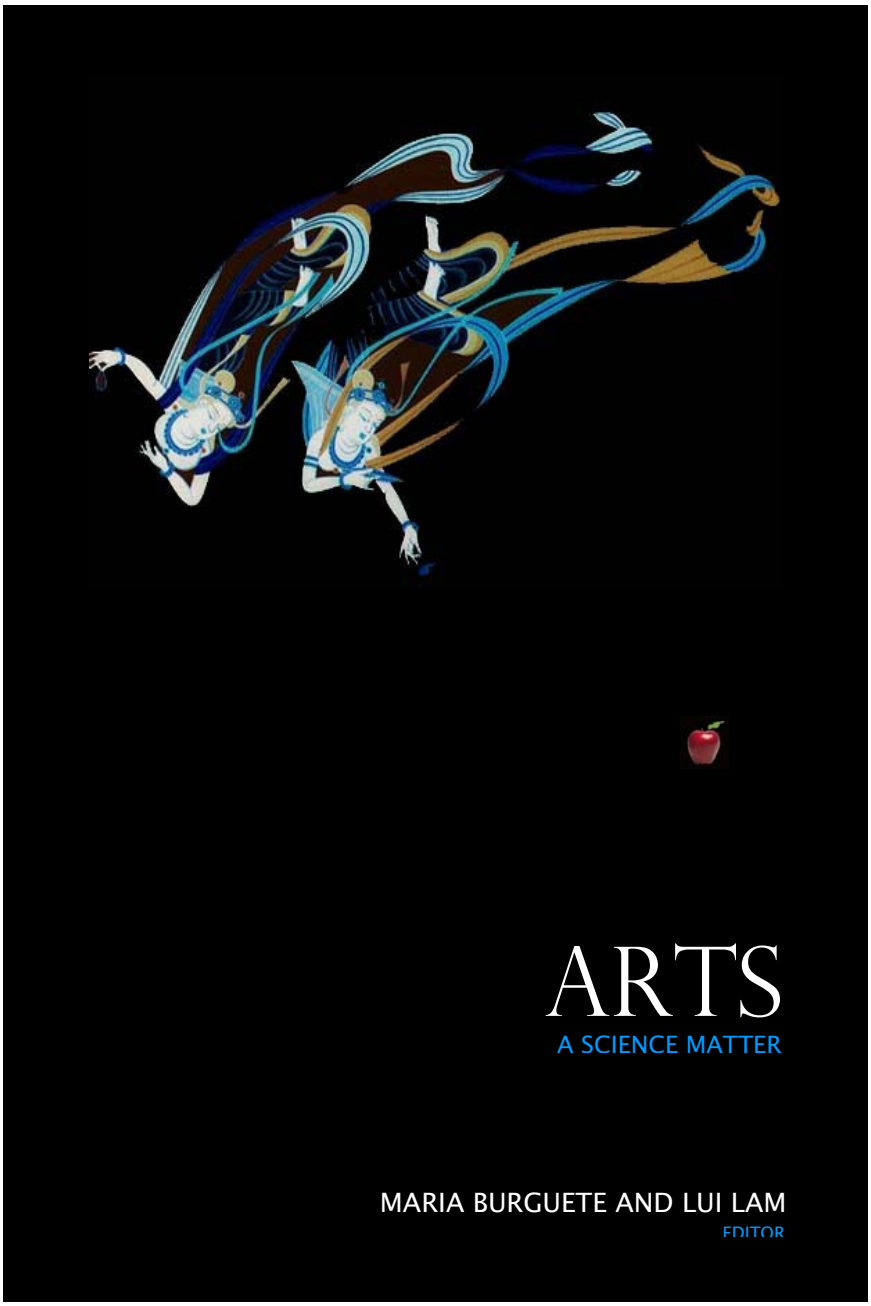

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Science Matters Series

Lui Lam
Founder and Editor

Science Matters (SciMat) is the new discipline that treats all human-dependent matters as part of science, wherein, humans (the material system of *Homo sapiens*) are studied scientifically from the perspective of complex systems. That "Everything in Nature Is Part of Science" was well recognized by Aristotle and da Vinci and many others. Yet, it is only recently, with the advent of modern science and experiences gathered in the study of evolutionary and cognitive sciences, neuroscience, statistical physics, complex systems and other disciplines, that we know how the human-related disciplines can be studied scientifically. Science Matters Series covers new developments in all the topics in humanities and social sciences from the SciMat perspective, with emphasis on the humanities.

Books in Series

1. *Science Matters: Humanities as Complex Systems*
   M. Burguete & L. Lam, editors

2. *Arts: A Science Matter*
   M. Burguete & L. Lam, editors

Preface

Science Matters is the new discipline that treats all human-dependent matters as part of science, wherein, humans (the material system of *Homo sapiens*) are studied scientifically from the perspective of complex systems. That “everything in Nature is part of science” was well recognized by Aristotle and da Vinci and many others. Yet, it is only recently, with the advent of modern science and experiences gathered in the study of evolutionary and cognitive sciences, neuroscience, statistical physics, complex systems and other disciplines, that we know how the human-related disciplines can be studied scientifically.

Science Matters (SciMat) covers all the topics in humanities and social sciences, arts in particular. Arts here include visual arts, literature, film, music, architecture, performance arts, new media arts and so on.

This book treats arts as part of science, from the unified perspective of SciMat. It is probably the first and only book to which academic professionals and practicing artists contribute, as equals, on the common theme of creating and understanding arts. It contains 17 chapters, with 18 contributors who are prominent humanists, professional artists or scientists. It consists of three parts: Part I: Philosophy and History of Arts; Part II: Arts in Action; Part III: Understanding Arts. The book is aimed at both research scholars and laypeople. While the discussions presented in the chapters of this book are very general and definitely applicable to all kinds of arts, for practical reasons, specific examples are mostly confined to visual arts, literature and film. We hope to cover other parts of arts in the future.

Two other features of this book should be mentioned. First, arts studies, like in any other discipline, can be and are carried out with three different approaches: empirical, phenomenological and bottom-up. (For the humanities, with arts as a particular case, the bottom-up approach could be starting from the neuro or the genetic level.) All these three approached in arts studies are represented in this book. Second, the general nature and the origin of arts, an unsettled problem for 2,400 years since Plato's time, are addressed in four chapters in this book. In particular, a plausible answer to this important problem is presented for the first time (Chapter 1).

It is our wish that this book will help to start a new trend in arts studies; that is, arts scholars and practicing artists work together, treating arts as part of science.

Rio Maior, Portugal — Maria Burguete
San Jose, California — Lui Lam

Contents Summary

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PART I PHILOSOPHY AND HISTORY OF ARTS

1

Arts: A Science Matter

Lui Lam

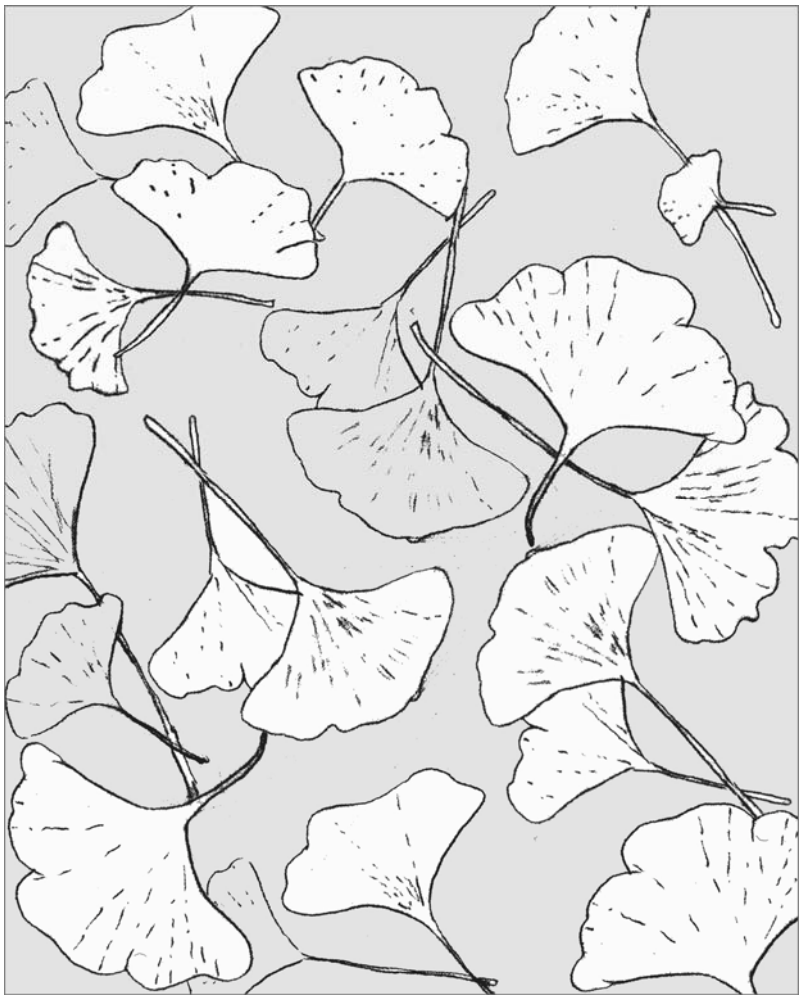
The nature and origin of arts, and its relationship to "science" have been under much debate since Plato about 2,400 years ago. Here, a new perspective on these issues is presented. Science is to understand how nature works, while nature consists of (human and nonhuman) living systems and nonliving systems. Consequently all human-dependent matters are part of science—the premise underlying the new discipline called *Science Matters* (SciMat), which covers all topics in humanities and social sciences, arts in particular. (Arts here refer to visual arts, literature, film, performance arts, music, architecture, new media arts and so on.) In fact, arts are a subset of humans' creative activities that aim to excite the receiver's neurons in a certain manner, through that person's senses, with or without significant consequences. The usual kind of "science" is to understand mostly inanimate, simple systems and how the world/universe works; it is part of science in general. Arts as a science matter is to find out everything about arts, including arts' origin and nature, and how and why arts work at both ends of the creator and the receiver. Like physics and any other discipline, arts can be classified into two types—*pure arts* and *applied arts*. Some arts, such as drawing and performance art, could start a million years ago. All arts evolved over time and space, and the contents kept on changing as humans invented language and writing and as they migrated out of Africa and spread over the world; arts contain both global universal elements and local features. Here, all these issues as well as how arts as a science matter could be studied are elaborated, after a brief introduction to SciMat and humans' development history and inheritance mechanism (genes and epigenes) is given.

1.1 Introduction

Arts in this chapter refer to visual arts, literature, film, performance arts, music, architecture, new media arts and so on. The origin and nature of

PART I

Philosophy and History of Arts



2

The Latin "*Artes*" and the Origin of Modern "Arts"

Brigitte Hoppe

This chapter will analyze the range of attitudes held by scientists and artists observing and presenting natural phenomena at various periods of time. It will explain the meaning and significance of the principal fields of education called the "liberal arts" and the "mechanical arts" since the Late Antiquity. Both areas comprised no less than seven disciplines including sciences, mathematics, artistic and technical skills. In the European civilization, these were the essential elements of education and learning until the 18th century. Certain interrelations between sciences and arts can be better understood by examining particular early collections of artifacts produced in Early Modern Times (16th–17th centuries). Sciences and arts began to deviate from one another in the course of growing specialization and changing societies in the modern world. In Antiquity (4th BC–5th centuries AD) and from the Late Middle Ages (15th century) on, artists and scientists became eminent observers of natural objects such as plants, animals, minerals, the stars in the sky, and the topography of special regions, e.g., the Netherlands coastal areas with its sailing ships, and the tropical forests of Brazil. Portraits of scientists often include typical objects such as a skull representing the field of anatomy, or an armillary sphere for astronomy. Since the 17th century we find critical discussions of scientific life, work, and the impact they made: the focused concentration of an alchemist and the social impact of scientific innovations. The discussion of the relationship between technical inventions, e.g., the steam engine, cars on a highway, multi-storey buildings in a small city street, and the bare necessities of human life furthered the development of a critical worldview in fine arts. In abstract sculptures and paintings, in particular in the style of "concrete art", geometric figures and spectral colors recur, but their meaning in an individual composition is different rom a direct representation; artists of our time are able to present a unique interpretation of the world around them in their works of individual imagination.

3

Science and Art: A Philosophical Perspective

Guo-Sheng Wu

The original source of modern science is Greek liberal humanities. Modern art is something called fine art which is the heritance and development of ancient ideal of free arts. Freedom is the common essence of both science and art. As soon as their Greek mind emerged, the two immediately recognized each other as brothers who were separated from and lose touch with each other for a long time. This is why science and art know each other very well while they are two different departments of human culture.

3.1 Introduction

The distinction between science and art is clear. However, there are also many famous scientists, artists and humanists who emphasize the similarities between science and art and their internal intrinsic association. Science and art have great differences, since the creation of aesthetic object is the aim of Art but the object of science is not created by Science. Yet, many scientists emphasize much on the role of aesthetics in scientific research. Thus it raises a question: What kind of interrelationship it is that is between science and art?

3.2 Origin of “Science”

Here, the origin of the word “science” is discussed. To modern people, the main difference between science and art appears to be that the two

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Neuroarthistory: Reuniting Ancient Traditions in a New Scientific Approach to the Understanding of Art

John Onians

There is a long tradition of using neuroscience to understand art. From Aristotle to Baxandall scholars who we might think of as humanists have turned to science for help. This, however, became unfashionable at the end of the twentieth century and the practice is only now being revived, reuniting ancient traditions. This chapter presents some of the latest knowledge of the brain that is revolutionizing the field and illustrates its application. It also argues that the issue of whether humanistic and scientific traditions can be reunited is crucial to the future of intellectual enquiry.

4.1 Introduction

Art as part of science has a long tradition, dating back at least to Aristotle, one which unfortunately was broken after the Roman Empire. However, today the importance of the link between the fields is recognized by more and more humanists.

4.1.1 *A Long Tradition*

Two and a half thousand years ago in ancient Greece Lui Lam's vision of the arts as an aspect of science [Lam, 2011] would have been normal. This was especially true in the school of Aristotle, who was happy, unlike Plato, to consider humans as just another type of animal, and who wrote studies of politics and drama, for example the *Politics*, which are in many ways as scientific as his studies of biology, such as the *Parts of*

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Science and Art in China

Bing Liu

Although the idea of Science and Art (S&A) has been suggested for quite a long time, the real concern for this topic in China was raised only in the last 15 years or so. Since then, many research papers and dissertations have been published in this field. In this chapter, the brief history and status quo of the studies on S&A in China are reviewed, including, e.g., the important events, conferences, exhibitions, and publications. Works on S&A from China are classified into four categories with different depth levels. Existing problems in the development of S&A in China are summarized and discussed.

5.1 Introduction

Science and Art (S&A for short; or, as referred by others, Art and Science) is a rather vague and ill-defined area. It includes many contents and research works that are directly or indirectly related to S&A. It also covers some relevant activities of art creation and scientific research, and even some social activities on this theme. Here, the word science can be broadly understood to include technology.

This chapter provides a brief overview of the development of S&A in mainland China (early period in Section 5.2; later period since 1987 in Sections 5.3 and 5.4). In particular, Section 5.3 covers important conferences and exhibitions, while publications—books, journals, and research papers—on S&A are summarized in Section 5.4, wherein, research works are classified into four categories. Existing problems in

6

The Development of Science Theater

Ivo Schneider

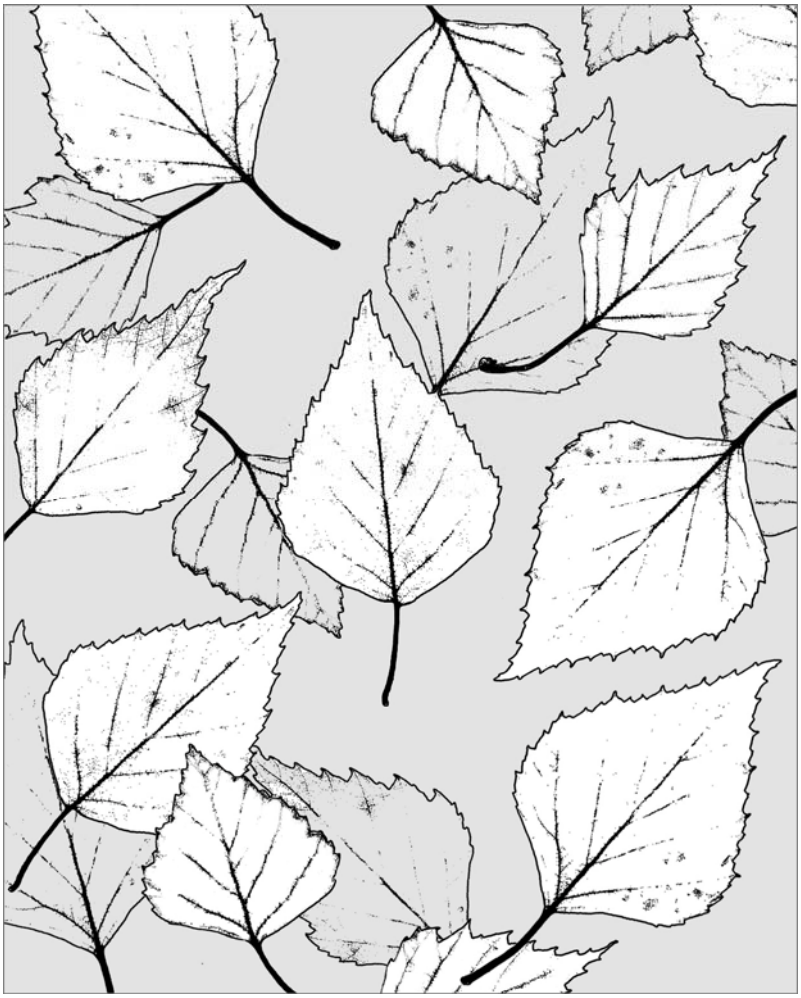
This chapter on science theater deals with those plays on stage in which science plays an important role. Science theater connects scientific activity and scientific results with the emotional and social realm of human life. Its roots can be seen in the dialogues of Galilei, de Fontenelle or Algarotti in the 17th and 18th century, albeit these dialogues could well have but never did enter the stage. Since the beginning of the 17th century, the spectrum of science theater has ranged from unreserved approval combined with the conviction that an improvement of social and economical conditions can only be achieved by scientific progress to fear and refusal of science. Different from other countries science theater in Germany could never claim any status except for a short period, during which it pointed mainly to the negative aspects of scientific activity. The reason behind this unique phenomenon is explored and explained as due to the persistence of the Bildungsbürgertum mentality in Germany. Presented also in this chapter is a long discussion of the science theaters staged around 2000 in New York and London, those in German speaking countries (*Life of Galileo*, *The Physicists*, and *In the Matter of J. Robert Oppenheimer*), the two most successful science theaters of recent years (*Copenhagen* and *Infinities*) as well as science theaters authored by scientists (e.g., Carl Djerassi) and historians of science (e.g., Marc Friedman). France is discussed as an example for a nearly continuous development of science theater from the 17th century.

6.1 What Is Science Theater?

Science theater has different connotations. In today's science centers some of them claim a science theater. This holds for the *Phaeno* in Wolfsburg or the new science center in Hamburg, which will be finished

PART II

Arts in Action



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Silence in Arts

Cristina Leiria

In silence many things I have been finding and most of them are subjective, therefore resulting from my own experience. On those bases through the development of work started as an architect I have reached the sculpture world where I was given the opportunity to share an immensity of feelings related not only with the silence but also with light and peace. Through several stages of creativity we can be transported to new worlds.

7.1 Introduction

I, Cristina Rocha Leiria, architect specialized in Development Planning, has been working in sculpture and ceramics since 1993. My work is a form of art open to love and beauty, or at least it is my spirituality that enables me to conceive and produce this kind of art.

In this chapter, we can learn more about my experience as an artist through the presentation of my work, so we can realize the meaning of this message—*Silence in Art.*

Starting my professional life as an architect, I am now an architect with a sculptural approach and in recent years I have been devoting my work mostly to monument building and public art, trying to achieve my main purpose: the re-harmonization of the human spaces, both public and private.

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Linsen's Art

Linsen H. Ngai

Linsen Hsia Ngai was a professional chemical physicist before becoming a self-taught watercolor painter about 25 years ago. Her selected artworks are presented here, in a chronological order.

8.1 My Background

I obtained a B.S. degree in Chemistry from the University of California, Berkeley, and my M.S. and Ph.D. degrees from University of Chicago majoring in Chemical Physics. After retiring from scientific research I became a watercolorist. I am a self-taught artist. I started out doing black and white paintings on Chinese paper and using Chinese ink. As I evolved as an artist, I began to use more color and less ink and eventually not using Chinese ink at all. I am still doing watercolor paintings on Chinese paper. My subject matter includes birds, animals, flowers, plants, landscapes, and figures and portraits. I want to show through my paintings the beauty of nature and to pass it on to future generations to enjoy.

8.2 Early Period

As a beginner in art my very first attempt was learning how to paint bamboo by using various shades of Chinese black ink and doing different

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From Curiosity to Creation: The Art of Holly Lane

Holly Lane

For the last several centuries specialization has caused science and art to diverge so as to seemly have little in common. However, a basis of commonality between art and science is the trait of curiosity, and both disciplines teach us to look attentively. The benefits science has bestowed upon the arts and humanity are acknowledged, and in turn the benefits the arts offer are cited. Reflections on the various definitions of art and speculations on the origin of art are offered from the perspective of an exhibiting artist. Some of the ways artists think about and approach, diverse kinds of art and the creative process will be discussed. Concluding, the artist's own work will be presented and prefaced by some of the concepts that shape the artwork.

9.1 Introduction

In the beginning, of human life, there was curiosity. In the beginning of each individual human life there is curiosity. Children are not embarrassed to ask questions, all kinds of questions. Even pre-articulate babies are curious; curious about balls of lint, noses, and the activity of the family dog. As individuals we are fortunate if, as we mature, curiosity is not squelched by fear, peer pressure, and inhibitions. If humankind was not curious we would probably not have science, art, philosophy, myths, poetry, books, electricity, medical cures, space exploration, zippers, and cheesecake, to name just a handful. Since there is so much to be curious about, to explore, individuals generally pick one category in college (or equivalent) that ideally, in alignment with

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Making Movies and Making Physics

Hark Tsui and Lui Lam

The characteristics and experiences of making movies and making physics are discussed, respectively, by a movie director/producer and a physicist. Similarities and differences between the making of movies and the making of physics are presented. Discussions on the nature of movies and physics, on creativity and innovation as well as on the joy of making movies and making physics are provided.

10.1 Introduction

Making movies is a creative process that involves several operational stages: (1) conception of the project, (2) lining up the funding, (3) finding coworkers, (4) shooting the movie, (5) post-shooting work, and (6) marketing and distributing the movie.

Making physics means creating new physics—doing physics, or physics research, at its best. It is also a creative process and, like making movies, involves the same six stages in its operation, from the beginning to finish. The exception is that when doing pure theory or simple experiments, stages (2) and (3) may be absent.

Hark Tsui has been directing and producing movies since 1979 [Ho & Ho, 2002; Morton, 2001] and Lui Lam published his first physics paper in 1968 [McMillan et al, 1968]. Presently, Tsui has directed/ produced over 70 movies and Lam has published over 170 research papers and 12 books. The two knew each other since 1975 when both were doing community work in the New York Chinatown, in lower Manhattan.

11

A Journey along the Borderland: A Critical Approach to Artificial Intelligence-Based Art and Literary Practices

Jichen Zhu and D. Fox Harrell

Digital media open up opportunities for new integrations of art and science. However, the close contact between the multiple cultures in either tradition also unveils fundamental value differences that impose considerable difficulties in performing interdisciplinary work. In this chapter, we identify a new form of this cultural divide in the context of computer art and digital media practices. Next, we identify a growing number of practices that engage the capacity of the computer to abstractly represent data and to process it algorithmically in order to serve expressive, critical, and generalizable purposes. In particular, we explore artificial intelligence-based art and literary practices that actively negotiate the hidden assumptions and push the disciplinary boundaries of both art and science. Finally, we present our AI-based interactive narrative work *Memory, Reverie Machine*, which engages literature, cognitive science, and AI. It illustrates our perspective and strategy of combining art and science practices synergistically, as part of a growing community for which the exploring of the borderland between art and science can transform not only particular technologies or how they are perceived, but also end goals and values.

11.1 Introduction

Half a century ago, British scientist and novelist C. P. Snow [1964] delivered a now notorious talk on the increasing gap between the two cultures of the sciences and the humanities [Lam, 2008]. Reflecting on

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ChemArt and BioArt: Art-Science Interactions

Maria Burguete

The development of science is a time evolving process; so is Art. However Art began earlier and so far they still do not have a methodology the same way science has. Why does this happen? For a scientist truth results from the scientific methodology; for an artist truth comes from revelation plus inspiration. The structural unity of art can be seen as an expression, in the sense of an iconographic translation of the cosmic universe. Art deals with symbolism based on a platform that can move frontiers by overcoming the limits of common perception. Art is a place where new worlds are invented, and also where art itself is continuously being created. *ChemArt* refers to those artworks that use images or concepts from chemistry as the central theme, and occasionally, chemicals as a medium; similarly for *BioArt*, except that chemicals are replaced by biological materials**.** Considering ChemArt as the interaction between Chemistry and Art, we can say that flexibility of nature enhanced the emergence of both chemistry and art: Chemistry allows us to understand diversity and beauty of nature at the molecular level, and awakens our curiosity about its "modus operandi"; Art, through the interaction of human beings with the environment, induces an expressive reaction by contemporary artists. ChemArt naturally leads us to BioArt, the same way that yesterday's chemistry leads us to the modern chemistry of living organisms or biochemistry. BioArt is the new challenge the contemporary world is facing now: a crossroad between artistic culture and scientific culture. A major question dealing with science and art is concerned with the incorporation of biological and biomedical tools in the performance of artistic works, and the use of living tissues as an *art medium.* This new approach strongly appeals to a straight cooperation and collaboration among artistic production and scientific practices. The ultimate aim of science is to look for a single unifying "theory of everything." Art does the same from an iconographic point of view, and includes spirituality.

PART III

Understanding Arts

13

On the Origin of Literary Narrative and Its Relation to Adaptation

Patrick Colm Hogan

This chapter takes up the relation of literary narrative to adaptation. Due to the species-wide nature of most biological adaptations, this involves a particular focus on the universal features of narratives. The first section defines several senses in which we may say that a complex practice, such as literary narrative, is "adaptive." Subsequent sections have two goals. The first is negative. Literary narrative does not appear to be an adaptation in the strict sense, though there is some, very limited evidence that it may have "ancillary" adaptive value. The second, positive goal is to indicate how we may, in part, understand the origin of literary narrative—or, more precisely, the sources of many universal properties of literary narrative—as a complex result of the interaction of various evolved systems and processes. Both arguments suggest that the term "by-product" might best be reserved for a particular type of biological phenomenon such that literary narrative is more appropriately categorized as (in part) "adaptation-derived" rather than as a by-product. The final section considers what consequences this analysis has for assessing the value of literature and the arts. This arises as an issue since many advocates of the arts and humanities seem to view claims of adaptive advantage as crucial for establishing the worth of art. This section concludes with an argument that seeking the value of art in adaptation is misguided.

13.1 On Literature and Adaptation

In the last decade or so, there has been a good deal of debate over the origin of the arts, particularly the degree to which the arts may

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Emotion, Cognition and Aesthetic Form in Vishal Bhardwaj's *Omkara* and Shakespeare's *Othello*

Lalita P. Hogan

Discussion in this chapter uses insights drawn from cognitive theories of emotion to illuminate aspects of Shakespeare's *Othello* in relation to its 2006 Hindi film adaptation, *Omkara*, by Vishal Bhardwaj. The first section draws attention to the common motif of sexual jealousy and domestic violence, contextualizing it broadly, by drawing attention to how readers read stories in relation to their own private "stories," and Martha Nussbaum's notion that literary sensibility cultivates compassionate imagination. This context is central to considering the role of emotion in literature and film. The second section provides a brief introduction to the Appraisal Theory of emotion, explaining how emotions are elicited in relation to various types of cognitive evaluation of events and environmental factors, as to their desirability and undesirability, emphasizing the central role played by imagination. It is in this way that representational reality can have real emotional impact, even though the people and the situations are unreal. The third section provides details about plotlines of *Othello* and *Omkara*, highlighting main characters, events and relationship configurations. The fourth section takes up a discussion of the *law of situational meaning*, comparing the film and the play, with focus on the central conceptual metaphor of stealing and thievery used in connection with socially prohibited marriage. The fifth section focuses on the role played by visualization of the object, the gift of love, the loss and recovery of which aligns aesthetic form to the *law of apparent reality*. The sixth and final section, appropriately, shows how the emotion *law of closure* organizes stage, screen and story time, leading inexorably to the tragic *denouement* in the play and the film.

15

Tanbi Novels and *Fujoshi*: A New Romance for Young Chinese Women

Ting-Ting Wang

In the 1960s, *tanbi* comics and novels which focused on boy's love came into being in Japan and was popular among young women. They, both readers and writers of tanbi, were women and called themselves *fujoshi*. At the late 1980s, Japanese tanbi comics but not novels became available in China. It was not until the end of the 1990s that tanbi novels with Chinese authors appeared in novel websites in China. Between 2005 and 2006, it became a main style of net novels in China. In this chapter, we first introduce the history of tanbi subculture in Japan, the two main types of tanbi texts, and the writing and publishing of tanbi novels in China. We then address the questions on why tanbi subculture is well accepted in China, what desires of young women are reflected in it, and how it challenges the mainstream culture.

15.1 Introduction

In the 1960s, *tanbi* comic came into being in Japan, the subject of which is boy's love. Handsome young men and boys, beautiful love and hot sex are universal elements in tanbi comics and novels. Most of he readers and writers of tanbi are young women with ages from 15 to 30; they call themselves *fujoshi*. After the introduction of tanbi comics to China in the late 1980s, tanbi novels written by Chinese started to appear in novel websites in China at the end of the 1990s. In the subsequent several years, they have only a small

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Objects in Art and Science

Nigel Sanitt

Up to the nineteenth century western art was dominated by the idea that art (paintings in particular) represented objects. This view termed *mimesis* assumed that (1) the world exists before and independent of the work of art; (2) the medium is a neutral means of representing objects. Mimesis today is only a small part of art theory, with representation of the world in art being seen as culturally and historically variable. The mimetic view of science (if I can refer to it as such) is that there is a world independent of the scientist and that science is neutral and objective. This is the dominant view of science today. In spite of enormous technological and theoretical progress in science during the last hundred years, it seems to me quite surprising that this mimetic view of science still holds sway and that in the sense I have described it, scientists do not seem to have caught up with the art theorists.

16.1 Introduction

This chapter is not about art theory (and I apologize to art theorists who think that I have inaccurately simplified their subject). My aim is to look at objects in science and use images (paintings and photographs) as a metaphor to highlight problems in interpreting scientific theories and the objects they claim to create.

As an alternative to the conventional view of scientific thinking, I describe a scheme which has as its starting point the idea that questioning is at the root of science (Problematology) and rejects an object-oriented mimetic view of science.

17

Su Dong-Po's Bamboo and Paul Cézanne's Apple

Lui Lam and Li-Meng Qiu

Su Dong-Po (1037-1101) of the Song Dynasty is arguably the most well-known poet and writer in China. He is also a distinguished painter; he liked to paint bamboos and rocks. Unlike his contemporaries and painters before him, the leaves in Su's bamboo painting are not necessarily attached to the stem. Paul Cézanne (1839-1906), a French post-impressionist, is recognized by Picasso, Matisse and many others as the father of modern art. He went beyond impressionism and painted many things including apples. Both these two artists tried to go beyond the appearance and show the *essence* of the objects they painted, in their own new ways. It was not by accident that these two painters—one from the East and the other from the West, separated from each other by about 800 years—had the same idea about painting. There must be something basic behind this. As shown in this chapter, the mechanism behind their techniques is based on how we see things, the cognitive science of vision in the human brain. The fact that Su's style was not adopted as mainstream, unlike that of Cézanne, is discussed; it is related to the unique nature of China's ultra-stable feudal system in the past, in which science and technology are implicitly or explicitly discouraged. Finally, the possible origin of Dong-Po Pork, for which Su is also famous for, is presented in an appendix.

17.1 Introduction

Su Dong-Po (1037-1101) from China and Paul Cézanne (1839-1906) from France (Fig. 17.1) lived about 800 years apart from each other, in two different continents. Both are pioneering painters. While Su is primarily a poet and writer, Cézanne is shy in writing [Cézanne, 1995, p. 9].

Acknowledgments

About two thirds of the chapters in this book are expanded, written versions of selected invited talks presented at the Second International Conference on Science Matters, *Arts & Science*, held in Estoril, Portugal, October 5-7, 2009, and co-chaired by Maria Burguete and Lui Lam. The rest of the chapters are invited contributions specifically for this book after the conference.

The Local Scientific Committee of this conference consists of João Calvão, Roberto Carneiro, Bernardo Herold, Luís Portela, Claudina Rodrigues-Pousada and Fernando Ramôa Ribeiro. The Advisors are Paul Caro, Brigitte Hoppe, Maurizio Salvi, Michael Shermer and Edward O. Wilson. The sponsors are Fundação Luso-Americana, Fundação para a Ciência e Tecnologia, Fundação Calouste Gulbenkian, Câmara Municipal de Cascais, Casino Estoril, Centro dos Congressos Estoril and Instituto Rocha Cabral. And the conference was under the auspices of the International Science Matters Committee, members of which are: Maria Burguete (Portugal), Paul Caro (France), Patrick Hogan (USA), Brigitte Hoppe (Germany), Lui Lam (USA), Bing Liu (China), Dun Liu (China), John Onians (UK), Nigel Sanitt (UK), Ivo Schneider (Germany) and Michael Shermer (USA).

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Maria Burguete received her Ph.D. in History of Science (contemporary chemistry) from Ludwig Maximilians University at Munich, Germany (2000). She was the very first biochemist to graduate from the Faculty of Sciences in Lisbon (1982), after completing a Bachelor's Degree in Chemical Engineering (1979) at the Lisbon Higher Institute of Engineering (ISEL). She is a scientist and a university lecturer with teaching and research experience in a wide variety of scientific fields. Burguete is now a scientific researcher at Scientific Research Institute Bento da Rocha Cabral in Lisbon, Portugal, and a Correspondent Member of European Academy of Sciences, Arts and Letters. She has published five books in the scientific field (and eight books of poetry) and over 30 scientific papers. *Email: mariaburguete@gmail.com.*

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