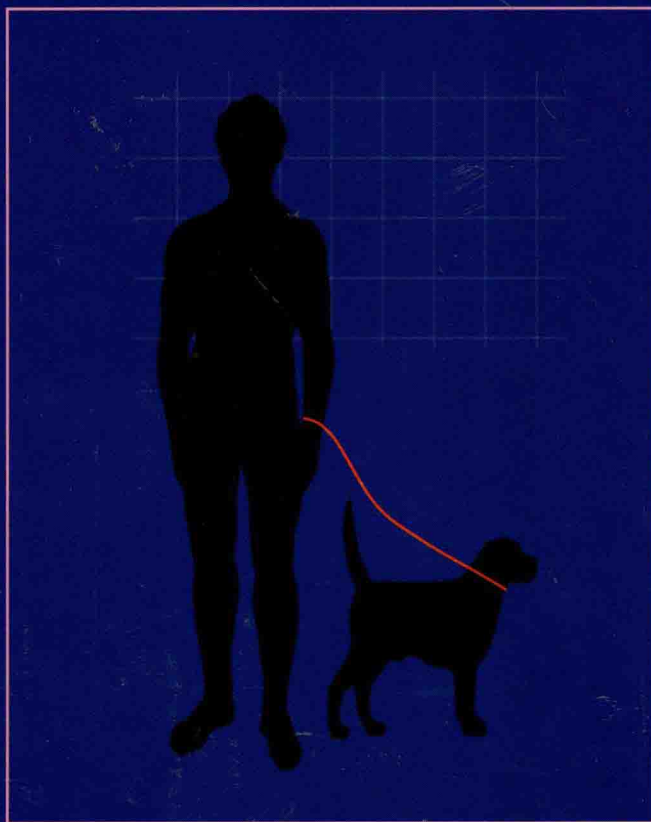


# ALL ABOUT SCIENCE

PHILOSOPHY, HISTORY, SOCIOLOGY & COMMUNICATION



MARIA BURGUETE AND LUI LAM  
EDITORS

Science Matters Series No. 3

# ALL ABOUT SCIENCE

PHILOSOPHY, HISTORY, SOCIOLOGY & COMMUNICATION

Maria Burguete

*Bento da Rocha Cabral Institute for Scientific Research, Portugal*



Editors

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# ALL ABOUT SCIENCE

PHILOSOPHY, HISTORY, SOCIOLOGY & COMMUNICATION

# Science Matters Series

Lui Lam

Founder and Editor

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**Scimat** (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 Series covers new developments in all the topics in the humanities and social sciences from the scimat perspective, with emphasis on the humanities.

## Published

1. *Science Matters: Humanities as Complex Systems*  
M. Burguete & L. Lam, editors
2. *Arts: A Science Matter*  
M. Burguete & L. Lam, editors
3. *All About Science: Philosophy, History, Sociology & Communication*  
M. Burguete & L. Lam, editors

## Preface

The importance of science goes without saying. Yet there is a lot of confusion and misconception concerning Science. The nature and contents of science is an unsettled problem. For example, Thales of 2,600 years ago is recognized as the father of science but the word science was introduced only in the 14<sup>th</sup> century; the definition of science is often avoided in books about philosophy of science. This book aims to clear up all these confusions and present new developments in the philosophy, history, sociology and communication of science.

In fact, through a careful examination of the historical development it is not too hard to recognize that science is a subset of human activities aiming to understand how Nature—consisting of the human system and all nonhuman systems—works *without* bringing in God or any supernatural. In other words, what characterizes science is its secularity. This simple definition of Science—historically correct but missed by many people—is expounded by Lui Lam in Chapter 1. Also included there is an elaboration of the new discipline *Scimat* (Science Matters) which treats all human-dependent matters as part of science, with its immediate goal of setting up scimat centers around the world.

The nature and development of science are analyzed by the three interrelated disciplines, Philosophy of Science, History of Science and Sociology of Science while Science Communication, which depends heavily on the other three, is the discipline that connects the public to science. These four important disciplines are very young, emerged within the last century, and are part of the humanities. Chapter 2 by Lam

examines the four disciplines with new insights, from the perspective of scimat, and urges the expansion of their scope to include more complex systems, humans in particular. It should be pointed out that this book is probably the first one ever which treats the four disciplines collectively together.

In China, these four disciplines are grouped under the umbrella term “scientific culture” since the 1980s. Top scholars from China were invited to present their newest works here. The lack of scientific culture in ancient China is explained by Hong-Sheng Wang (Renmin University of China) in Chapter 4. The history of its development in contemporary China is summarized by Bing Liu (Tsinghua University) and Mei-Fang Zhang (University of Science and Technology Beijing) in Chapter 13. Guo-Sheng Wu (Peking University) writes on his favorable topic, the phenomenological philosophy of science (Chapter 3) while Jin-Yang Liu (Remin University of China) discusses in detail his idea of holism (Chapter 6). New insights on science in Victorian Era, on the “mistake” of Friedrick Engel and Mitsutomo Yuasa, are provided by Dun Liu (Chinese Academy of Sciences) in Chapter 8. Moreover, in Chapter 15, a thorough description of popular-science writings in early modern China, which played a crucial role in the introduction of science from the West, is written by Lin Yin (China Research Institute for Science Popularization).

Of course, the scientific culture originated in the West and has been widely covered in numerous books and articles. Still, presented in this book are four important articles: A summary of the three waves of science studies (Chapter 11) by sociologist Harry Collins, a unique insight on what scientists really know (Chapter 5) by physicist Nigel Sanitt, a historical description of medical studies in Portugal around 1911 (Chapter 9) by historian Maria Burguete, and a history and review on science communication (Chapter 14) by the expert Peter Broks.

Two more important articles on the history and sociology of science are written by Lam. Chapter 10 is his detailed, personal account of the why and how as well as the background and crucial events in establishing the International Liquid Crystal Society, a story never told before. It is written for those working in or interested in science, liquid crystals in particular, and for science historians. Chapter 12 is his

personal recollection of the six years of working in China, starting from the “Science Spring” of 1978, the year China’s reform-and-opening up *revolution* began. In this chapter, the development of soliton research and political climate in China experienced by the author is revealed for the first time.

Science consists of two parts: the scientific process and the resulting scientific knowledge. An example of these two parts in action is nicely demonstrated by Robin Warren’s description of his Nobel Prize-winning work on *Helicobacter* (Chapter 7).

Science, according to the definition in Chapter 1, consists of not just “natural science” but also the humanities and social science. We are thus very happy to be given the chance to showcase three articles in this book to illustrate this point. Kajsa Berg’s Chapter 16 describes neuroarthistory, a relatively new discipline, from Socrates to the “contextual brain”, a concept invented by the author. Ting-Ting Wang (Peking University), in Chapter 17, presents her in-depth analysis of online spy video games from the narrative and cultural perspectives, on how a game’s text is constructed and how the player’s pleasure is generated. Finally, the physicist-turned-historian Dietrich Stauffer’s Chapter 18 provides an easy-to-understand tutorial on statistical physics for humanists, with a step-to-step description of the simple but useful Ising model, finished with interesting applications in social science and a Fortran program. On top of that, a list of history titles that the author, and hopefully the reader, finds interesting is included.

The book’s 18 chapters are organized into five parts: Part I: Philosophy of Science; Part II: History of Science; Part III: Sociology of Science; Part IV: Science Communication; Part V: Other Science Matters. Hopefully, research scholars and laypeople will both find this book enlightening and useful.

*Rio Maior, Portugal*  
*San Jose, California*

Maria Burguete  
Lui Lam



## A Note on Chinese Names

There is no perfect way to write Chinese names in English. The spelling and ordering conventions of a Chinese name's characters are different in different geographical areas—mainland China, Hong Kong, Taiwan and United States. The conventions adopted in this book are as follows.

1. A contributor's Chinese name after the chapter's title always appears with family name *last* and the first name's characters (if more than one) connected by a hyphen. For example, Guo-Sheng Wu, a contributor in this book, corresponds to Wu Guosheng in mainland China.
2. All Chinese names in text and references are written with family name *first*, with first name's characters connected by a hyphen.
3. All Chinese names from mainland China are spelled out in pinyin.
4. For those who made their career in the US, whether they settled later in mainland China or not, their name's old spelling is adopted, i.e., *not* in pinyin. For example, Yang Chen-Ning in this book is Chen Ning Yang in the US (which would be Yang Zhengning if he made his career in mainland China but not in the US).
5. Lui Lam made his career in both places, outside and inside China. The name Lui Lam appears the same as a contributor and in text while his pinyin name Lin Lei appears also in text and reference list. (His family name, Lin in pinyin, is Lam in Cantonese.)

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