

艺术的本质  
及其  
与科学的关系

The Nature of  
Art and Its  
Relationship to  
Science

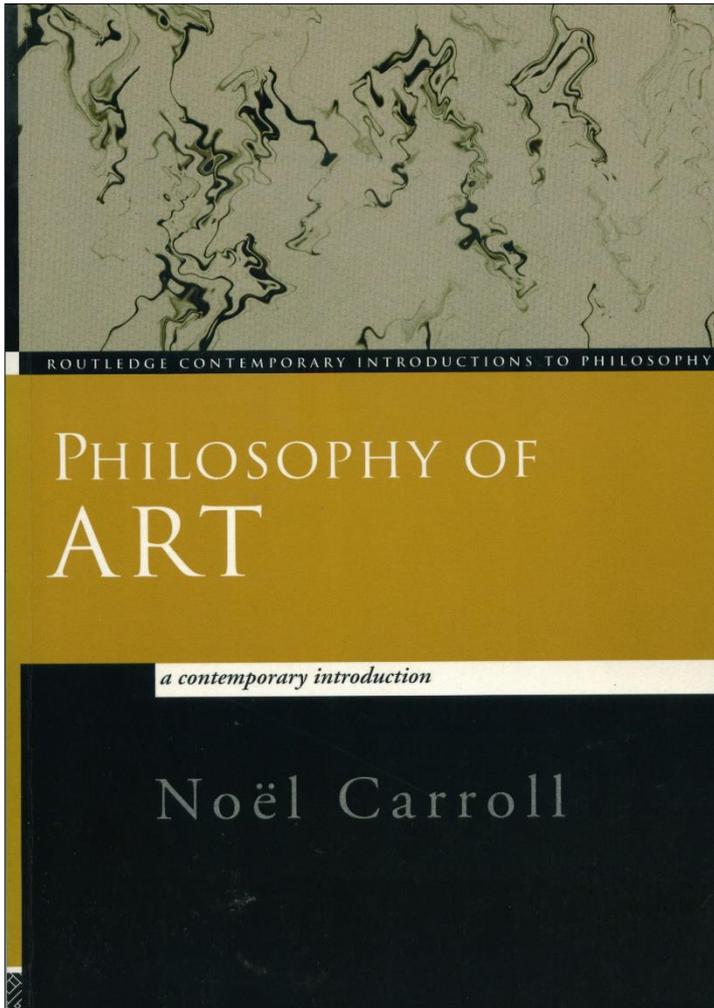
林磊

Lui  
LAM

# Categories of Arts

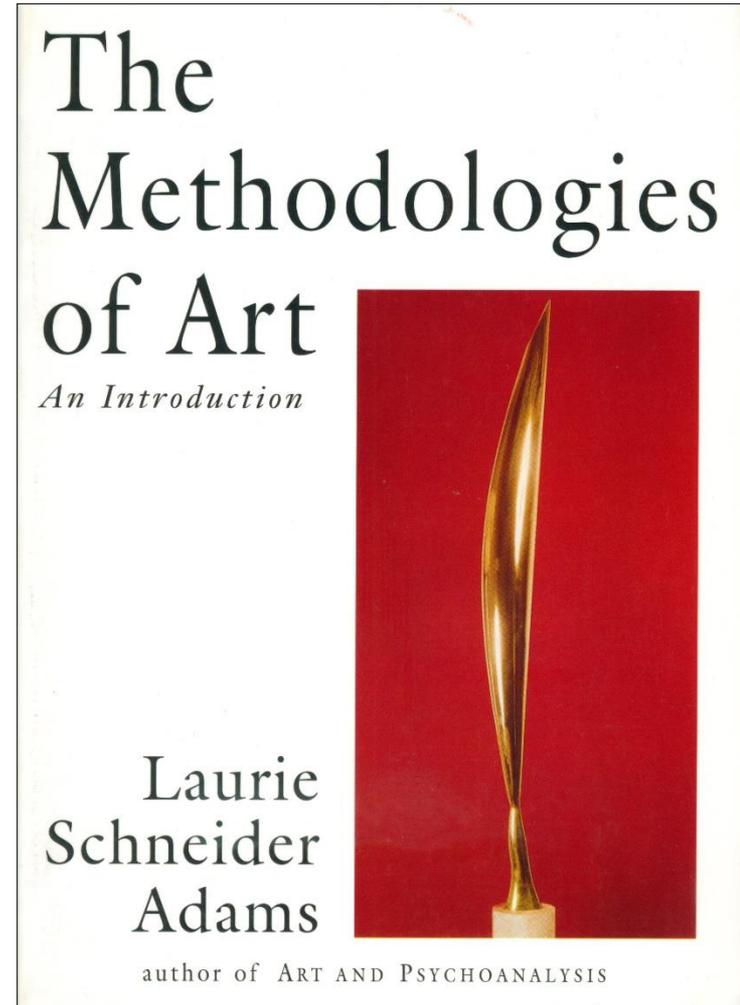
- Visual art (painting, drawing, sculpture, photo...)
- Film
- Literature
- Performing art (dance, drama, body/action art, linguistic...)
- Music
- Architecture
- Designing art
- New media arts (phonic, digital...)
- ...

# Collection of Failed Attempts



1999

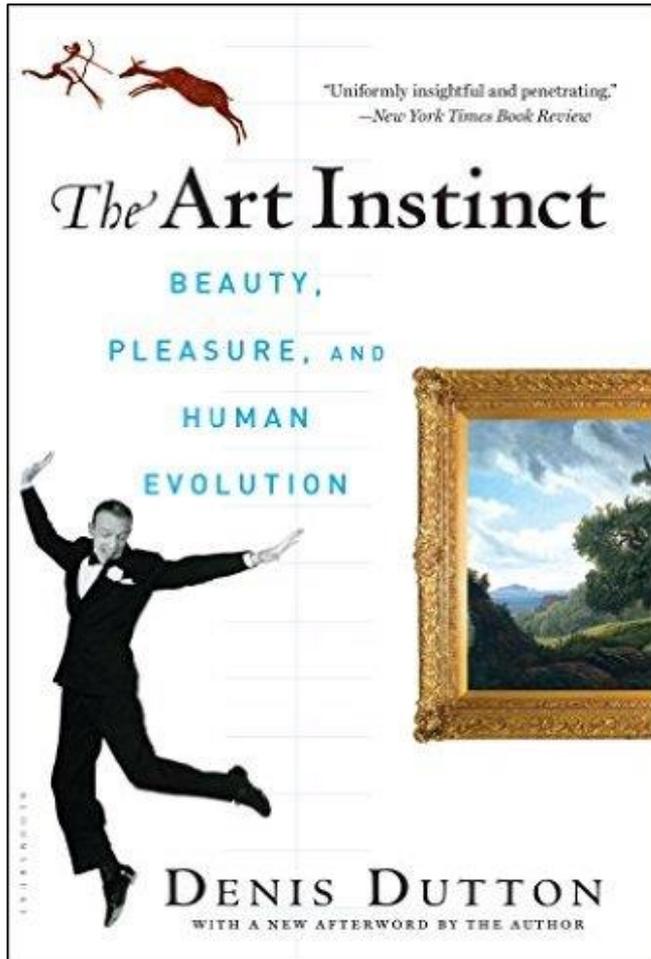
A collection of failed attempts  
in **defining** art



1996

A collection of failed attempts  
in **interpreting** art

## A Recent Failed Attempt in Defining Art



2009

### Dutton's 12 features of art

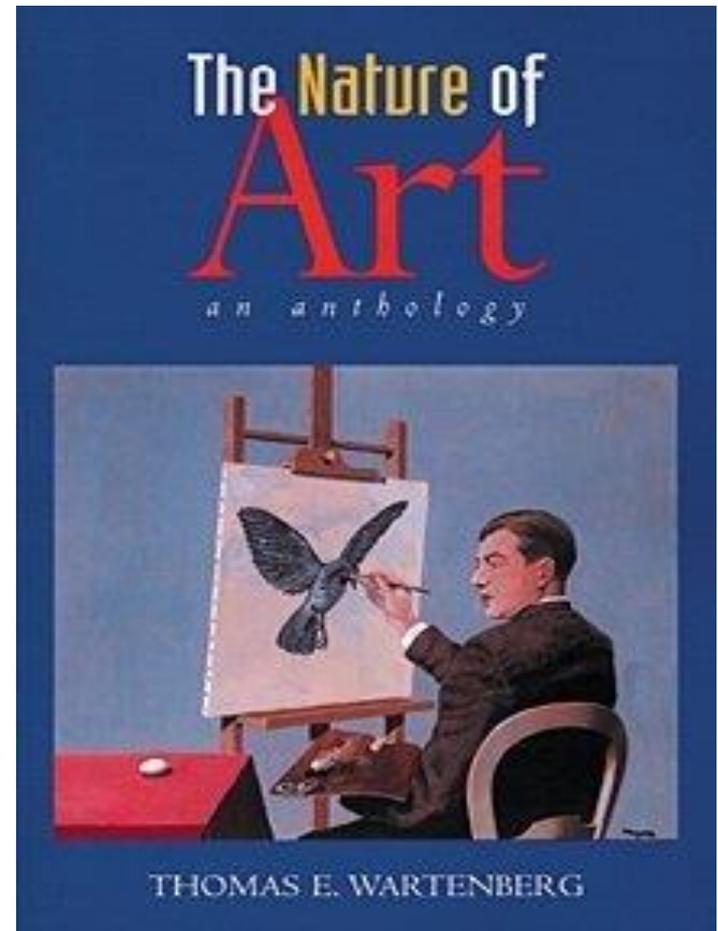
1. Direct pleasure
2. Skill and virtuosity
3. Style
4. Novelty and creativity
5. Criticism
6. Representation
7. Special focus
8. Expressive individuality
9. Emotional saturation
10. Intellectual challenge
11. Art traditions and institutions
12. Imaginative experience

Unfortunately, all these features are shared by the other creative discipline called physics, and hence are not unique to art

# Does Anyone Know?

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2001

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# Nature of Arts

# Arts and Aesthetics

For a long time, art was associated with aesthetics. **No longer so.**

Wu Da-Yu

吳大羽 1903–1988



- 1922–1927: Study in Paris
- 1928: Head, oil painting dept., National Art Academy, Hangzhou
- Students: **Zhao Wujie**, **Wu Quanzhong**, Zhu Dequen...



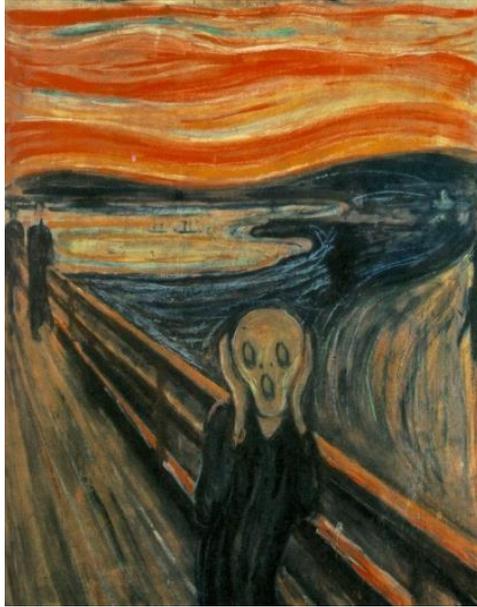
2015



# The Puzzle of Arts



Jean-Auguste Dominique Ingres  
*The Spring* (1820-1856)

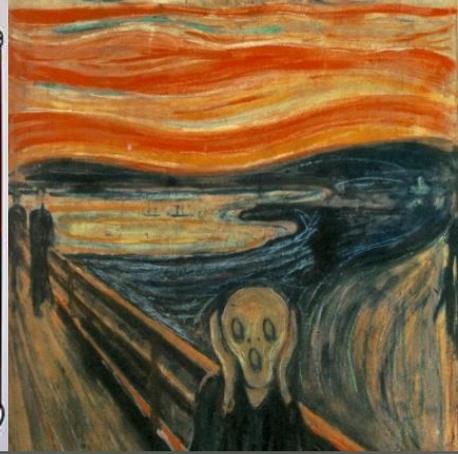
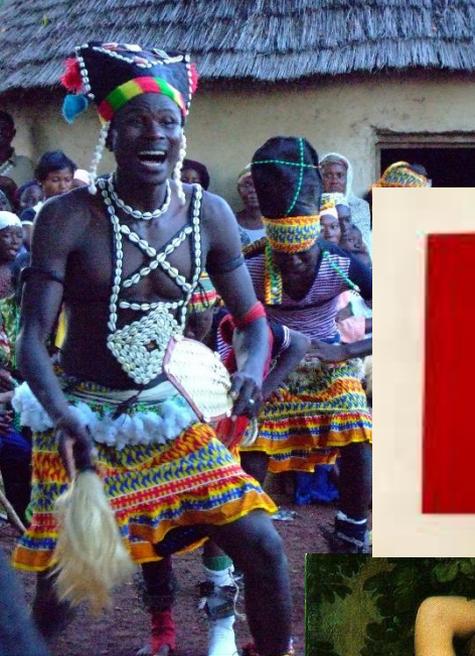


Edvard Munch  
*The Scream* (1893-1910)



Marcel Duchamp  
*Fountain* (1917)

- Arts are **not** always about **beauty** but could be about (all kinds of) **emotions**, too
- It is also about the **description and interpretation of everything else in nature**  
—just like in physics, say
- And it could be about “nothing”
- It is somehow **constrained by human nature**, too



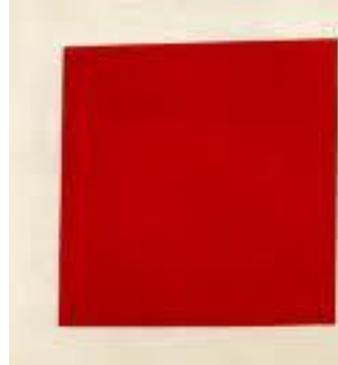
# Two Types of Arts

Applied Arts



Pure Arts

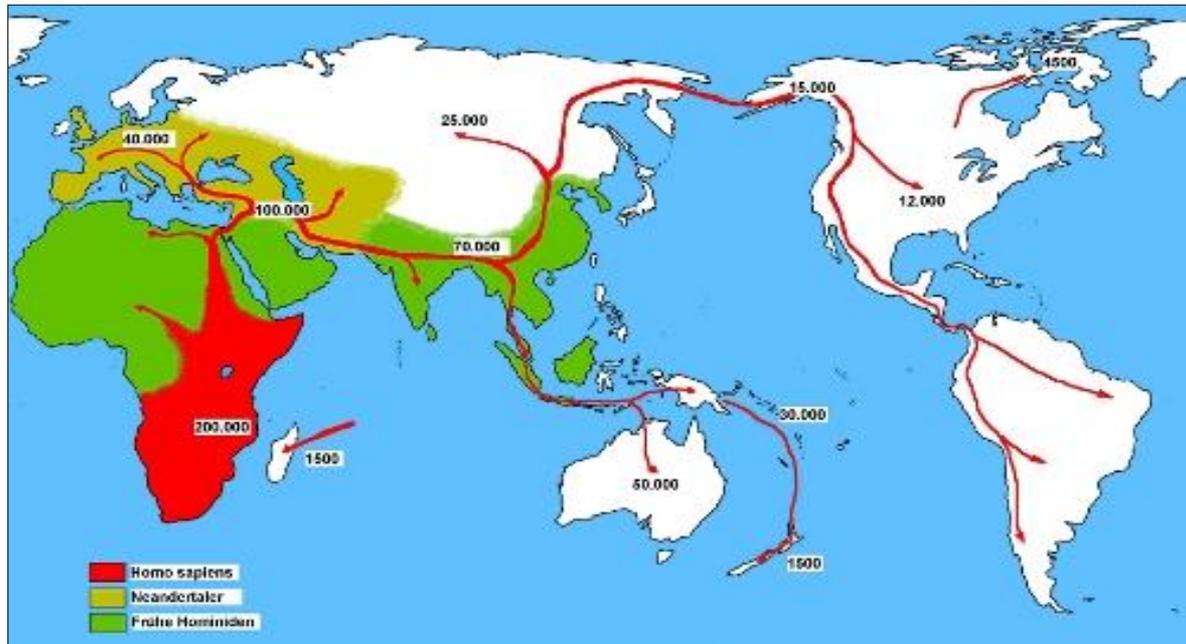
← The puzzle



# The Emergence of Arts

## Human History

- 1.6 million years ago, first use of **fire**; more complex stone tools created
- 400,000 years ago, earliest evidence of cooking
- 195,000 years ago, modern humans (*Homo sapiens*) appear
- 60,000 years ago, second wave of migration out of Africa



- **Mimesis** (to mime, imitate, gesture, rehearse of skill) was there **2 million years ago**.
- Three days of heavy rains. What would they do? They **created arts to kill time**.
- Arts was the first **safe** job in human history!
- **Applied arts** could start **1 million years ago**; **pure arts**, later, when community large enough to support professional artists, about **10,000 years ago**.

# Pure Arts: A New Perspective

## Five criteria of pure arts that last:

1. Aim at receiver's neurons
2. Kill time
3. Kill time gently and harmlessly
4. Passivity (physically speaking)
5. Human creation or intervention



Content and form of pure arts are secondary,  
to support Criteria 2-4 only !

PS: In the near future of AI-robots people will have more free time to kill;  
arts (and entertainment) will play an important role in the new economy

# Art and Science

# Arts and Science

Characteristics	Arts	Science
Both are part of science	Arts processes and studies are part of science (artworks not)	Mostly about nonliving systems
Different aims	Arts aim at receiver's neurons	Science aims to understand how nature works
Receiver	Arts need a receiver to appreciate the artwork	Science needs no receiver (but has to compare with Nature, the ultimate judge)
Different history	Arts started at least 35,000 (could be 1 million) years ago	Science started about 2,600 years ago since Thales (c. 624-c. 546 BC), after the invention of language and writing
Relationships between arts and science	<ul style="list-style-type: none"> <li>• Both involve creative process (for different reasons)—but same in many other human activities</li> <li>• Arts are humans' creation, reflecting on the world of human and nonhuman systems; the principles governing this world are the same principles (e.g., symmetry, spontaneous symmetry breaking, fractal, chaos, active walk) studied by scientists</li> <li>• Progress in science (and related technology) advances the development of arts; e.g., pigments → color painting, film/camera → photographic art, electricity → cinema, laser → photonic art, computer → digital art</li> </ul>	

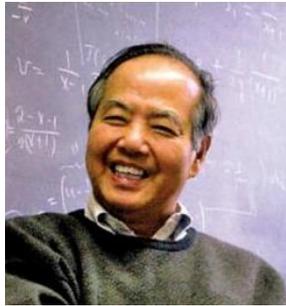
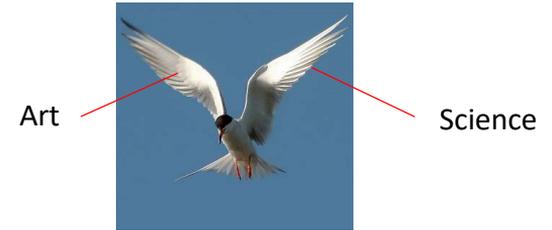
# The Importance of Arts



Cai Yuanpei (蔡元培) :

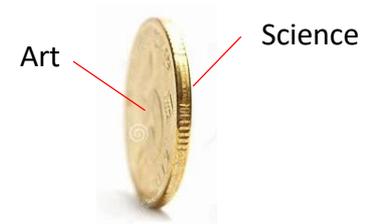
1868-1940

Science and art to **culture**, is like the two wings of a bird, the two wheels of a cart.



Tsung-Dao Lee (李政道) :

Science and art are as **inseparable** as the two sides of the same coin; the coin is **culture**.

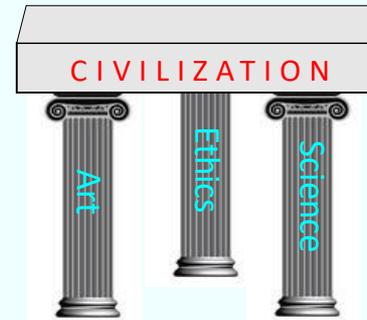


They are wrong !

Reasons:

- **Art and science** appeared at very different times
- They are **separable**
- Ancient Greece run quite well before science appeared

- Ethics exist since millions years ago (when broken, will cause instability of the civilization)

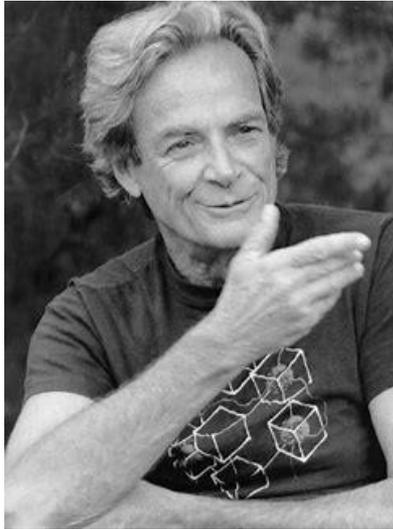


- **Art**, at least **35,000 years ago** (cave art)
- **Science**, **2,600 years ago**

Art and science are two (of three) major pillars of any **modern civilization** !

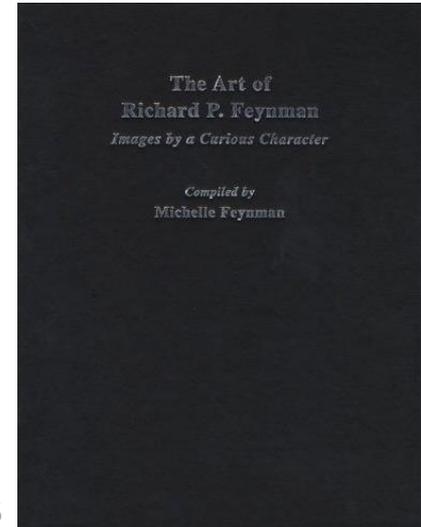
# Artist and Scientist

# Scientist's Art



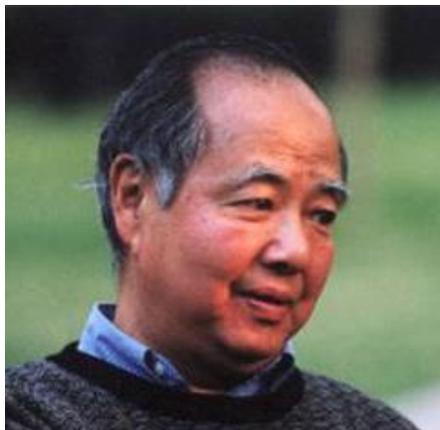
Richard Feynman

1918-1988



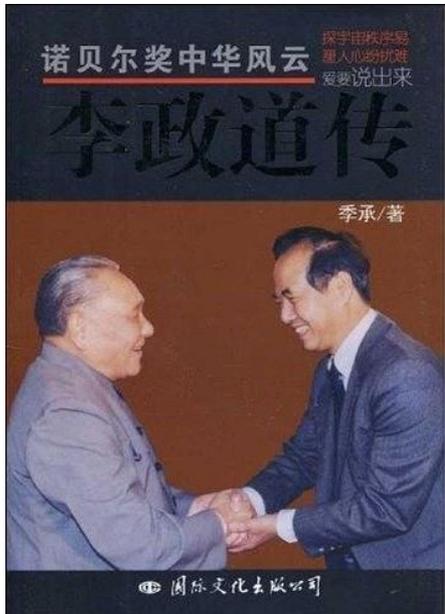
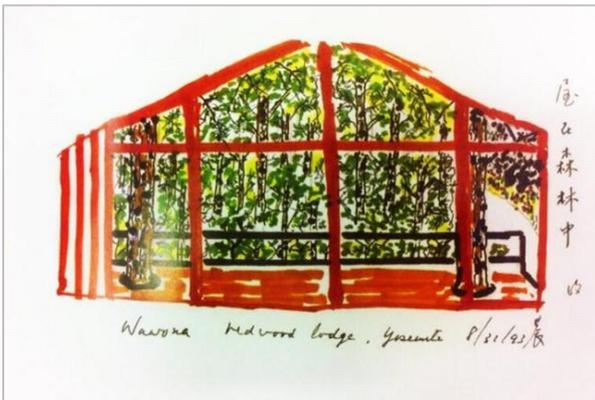
1995





Tsung-Dao Lee

李政道



2010



# Artist's Science

Leonardo da Vinci

1452-1519



Artist's science is generally better than scientist's art, it seems

# Artist-Scientist Interaction

Past - attempted



《核子重如牛，对撞生新态》。这是1989年李可染为中国高等科学技术中心举行的“相对论性重离子碰撞国际学术研讨会”创作的主题画



吴作人的《无尽无极》。1988年5月，中国高等科学技术中心举办“二维强关联电子系统国际会议”。吴作人在看了李政道的科普介绍后，用“两仪”变形图案表现二维强关联电子系统。

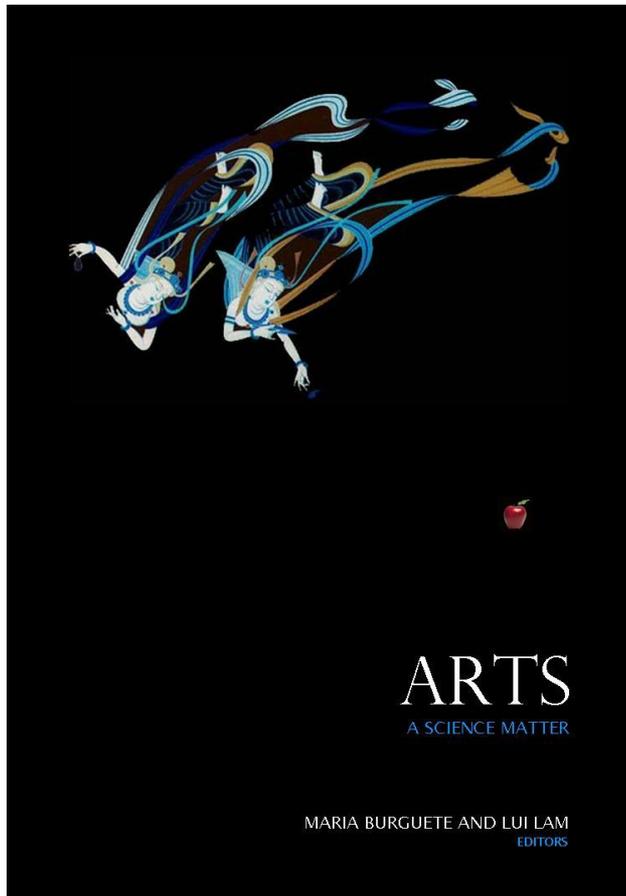
Present - recommended



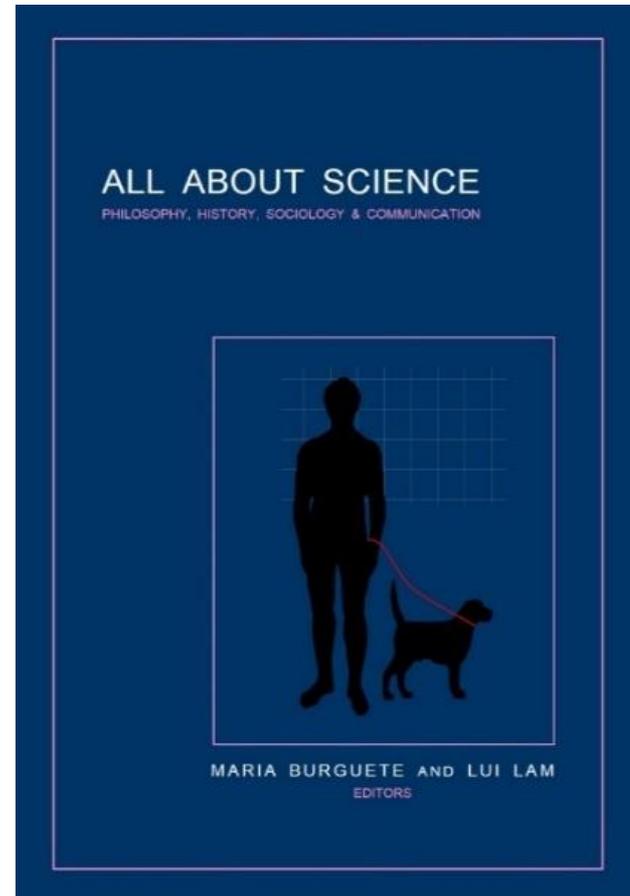
Artist and scientist go watching sunset **together**

Recommended for artists and scientists

Buy my two books and read Chapter 1



2011



2014

# Conclusion

- Arts appeared at least 35,000 years (cave art) ago, very likely **1 million years** ago
- Arts could be divided into **applied arts** and **pure arts** (just like in any discipline)
- **Pure arts** is to **kill time** gently, harmlessly and passively; the different means/contents (changed with time) are vehicles to achieve this aim
- Arts and science **both** are
  - **Creative processes**
  - Differ very much from each other in their aims and history
  - Both reflect nature
  - Arts are constrained by **human nature**; science constrained by **nature**
- Progress of science did **influence** significantly the development of arts, but **not** vice versa

# 文化自信

Su Dong-Po

苏东坡

1036-1101, Song Dynasty  
Poet, painter and mandarin



Bamboos and Stones

106 cm x 28 cm, partially shown

Some bamboo leaves are  
**detached** from stem



Ink Bamboo

131.6 cm x 105.4 cm

Wen Tong

Song Dynasty

All bamboo leaves are  
**attached** to stem

Modernism: Paint the essence of things  
Su said that 800 years ahead of Paul Cézanne

## Take Home Message

Art makes our life **worth living**

Science makes our life **comfortable**

**Art is much more important than science !**