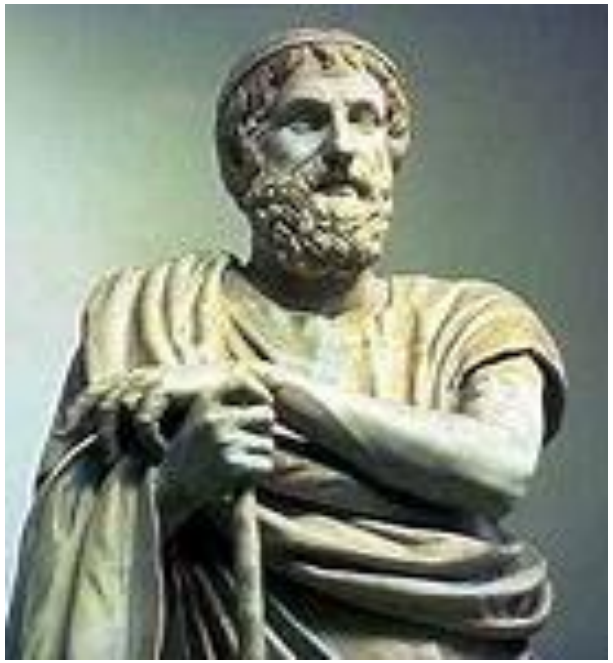
Humanities x “Science”

→ Innovation

Lui LAM（林磊）

San Jose State University
San Jose, California

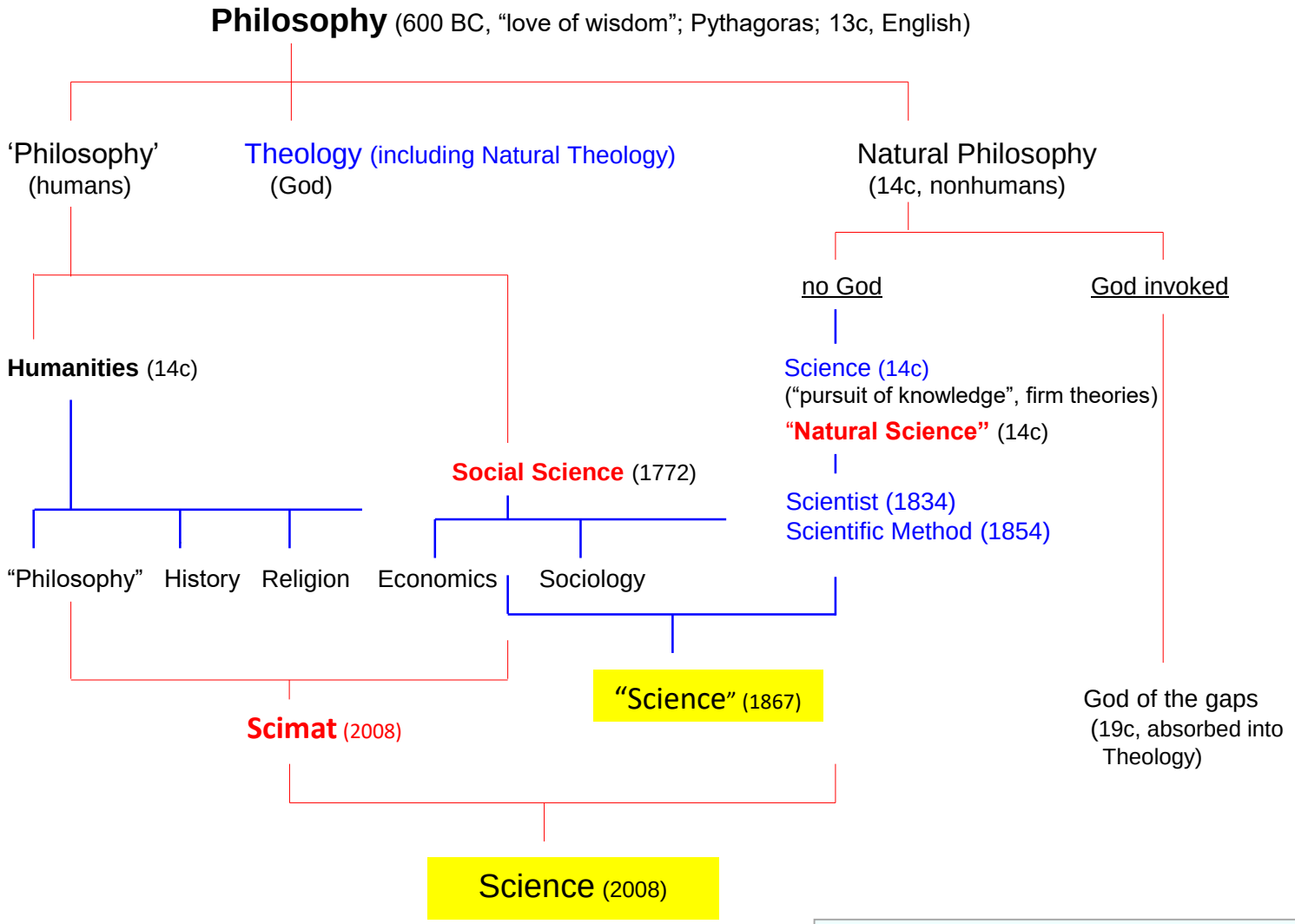
Science and “Science”



Thales
c. 620 BC - c. 546 BC

- The first philosopher and father of science
- Started trying to understand everything in the world without referring to the Greek gods—the beginning of philosophy (love of wisdom)
- But he did allow the existence of souls (even for a piece of rock)

Birth of Disciplines & of Science



Scimat website: www.sjsu.edu/people/lui.lam/scimat

Medical science does not fit into 'Philosophy' or "Natural Science"; it is part of Scimat (Science Matters, 人科) which includes all human matters.

Terminology

Science = Natural science

= Science of nonhuman systems + Science of humans

"Natural science" Social science + Humanities + Medical science

"Science" Scimat

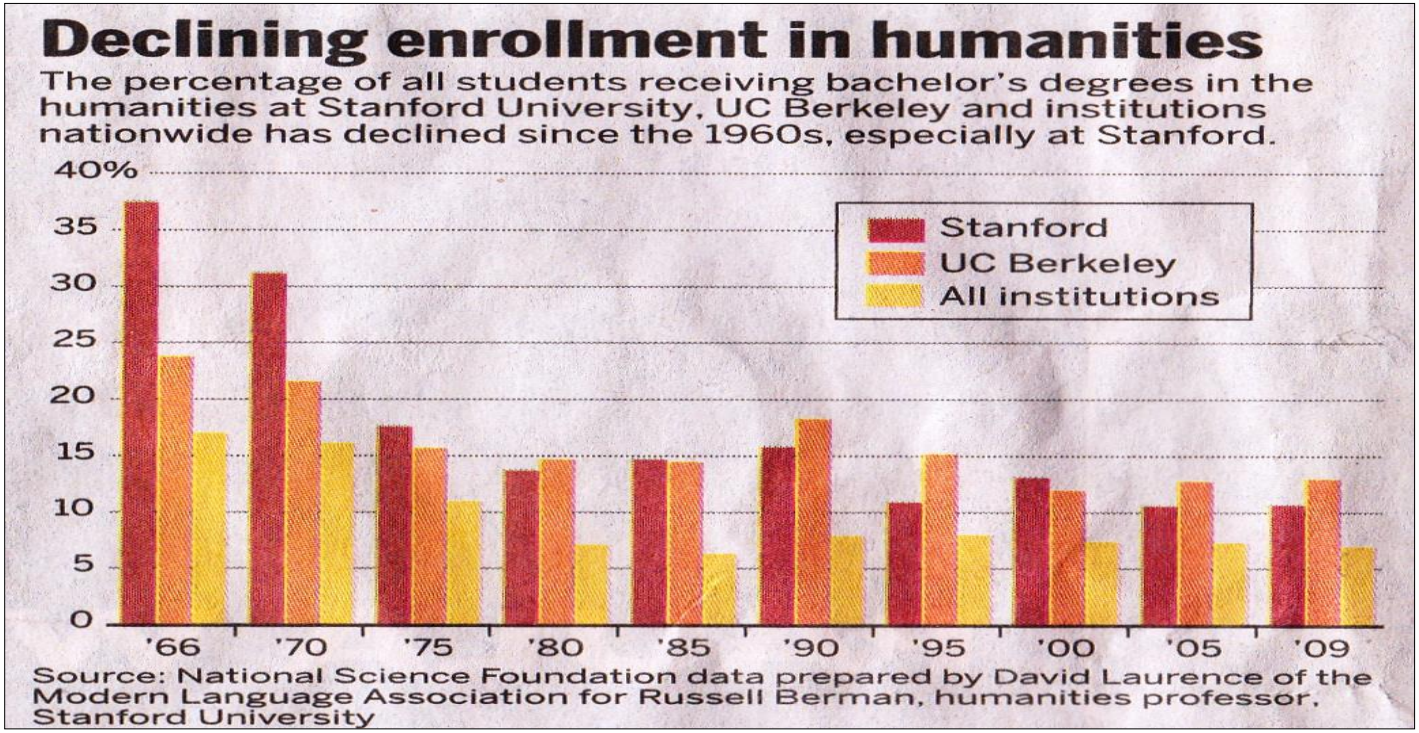
= "Natural science" + Scimat

NB: Humanities are not part of "science" but are part of science

What happened

- Science in the modern sense is a new word created in 1867, meaning to understand nature without invoking supernatural/God—a new concept, too
- After that, we retroactively look back in history and identify which parts of human activities belong to science
- And find, e.g., Thales (ancient Greek philosopher) was the first one who did that when he proclaimed "everything is made of water" so we call him the *father of Science*, and exclude his talks of soul from science
- Similarly, we identify part of the natural philosopher Newton's work on mechanics/gravity as science and call him a scientist while excluding his writings on God at end of *Principia* from science
- Thus, Thales and Newton are half scientists (Galileo is 100% scientist), irrespective of their other beliefs (soul or God)

Why Proper Definition of Science Is Important

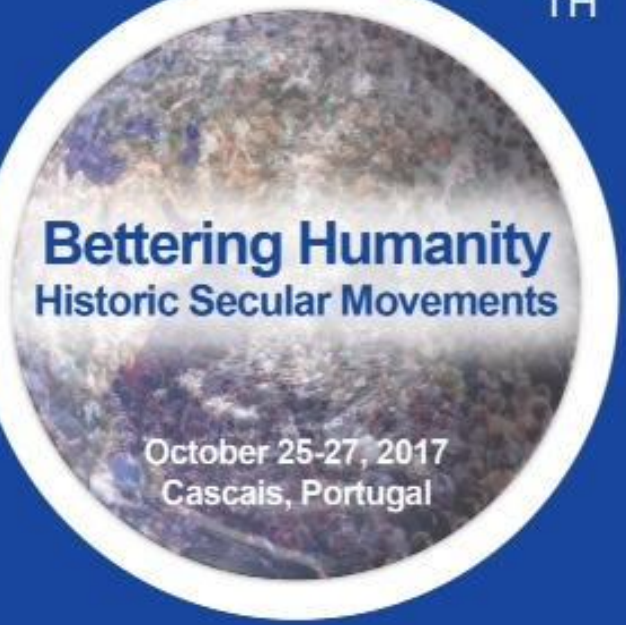


By recognizing humanities as part of science

- It will help to raise the scientific level of the humanities (and make a better world)
- And thus increase the enrollment of humanities in universities
- Will help humanities students to find good, exciting jobs

Sixth International Science Matters Conference

10TH ANNIVERSARY



Bettering Humanity
Historic Secular Movements

October 25-27, 2017
Cascais, Portugal

In the long history of humans' development, various efforts to better humanity have been proposed. This conference aims to review the secular movements which are historically significant, to understand how and why they mostly failed and in what ways they succeeded so that we can learn from them and do better with the Scimat approach. Examples of these movements in modern eras include the Enlightenment, the Vienna Circle and the Humanism movement. In this conference, reviews are presented by experts on the main theme of bettering humanity. But like in previous Scimat conferences, papers on all other science matters are welcome. It is also the occasion to celebrate the tenth anniversary of the scimat conference series and the Scimat Program.

Invited Speakers

Investment banking (Bank of NY, Deutsche Bank, Lloyds Bank) (Germany): FLORENTIN BOSSE	Letters Matters, Bibliotherapy and Musical Mathematics
Emeritus Professor of Faculty of History, University of Oxford (UK): JOHN R. R. CHRISTIE	Science, Secularism and Enlightenment: Then and Now
Professor University Paris 7 Diderot (France): CLAUDINE COHEN	Jean-Jacques Rousseau on Bettering Humanity: Music, Politics and Education
President of EASAL (UK/France): JEAN-PATRICK CONNERADE	The Contribution of British Atheist Reformers in the XXIth Century
General Secretary of United Nations (Portugal): ANTONIO GUTERRES	Bettering Humanity through the United Nations
Journalist & PhD in Communication (Spain): CRISTINA JIMENEZ	The Bilderberg Club
Comedian; President of British Humanist Association (UK): SHAPPI KHORSANDI	The Humanism Movement
San Jose State University professor (USA/China): LUI LAM	Bettering Humanity: The Scimat Approach
Evora University Biology Professor (Portugal): MANUEL MOTA	Bettering Humanity through Biology
Lisbon School of Arts Professor (Portugal): MIGUEL PAIS	Bettering Humanity through Arts
Pantaneto Forum Publisher (UK): NIGEL SANITT	The Eye in Ideas: Culture, Curiosity and Communication in Scientific Discovery
Max Planck Institute Berlin Researcher (Germany): ANNETTE VOGT	The Vienna Circle and the Role of Positivism
To be confirmed.	

Chairs

Maria Burguete (Portugal), Jean Pierre Cassarino (UK/France) and Lui Lam (USA/China)

International Advisors

Manuel Bicho (Portugal), João Caraça (Portugal), Patrick Hogan (USA), Brigitte Hoppe (Germany), John Onians (UK), David Papineau (UK), Nigel Sanitt (UK), Ivo Schneider (Germany), Michael Shermer (USA), and Robin Warren (Australia).

This conference is under the auspices of the International Science Matters Committee; members: Manuel Bicho (Portugal), Peter Broks (UK), Maria Burguete (Portugal), João Caraça (Portugal), Paul Caro (France), Patrick Hogan (USA), Brigitte Hoppe (Germany), Lui Lam (USA), Bing Liu (China), Dun Liu (China), John Onians (UK), David Papineau (UK), Nigel Sanitt (UK), Ivo Schneider (Germany), Michael Shermer (USA), and Robin Warren (Australia).

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further information: www.scimat-2015.com

Humanities x “Science”

→ Innovation

Arithmetic

$5 + 3 = 8$

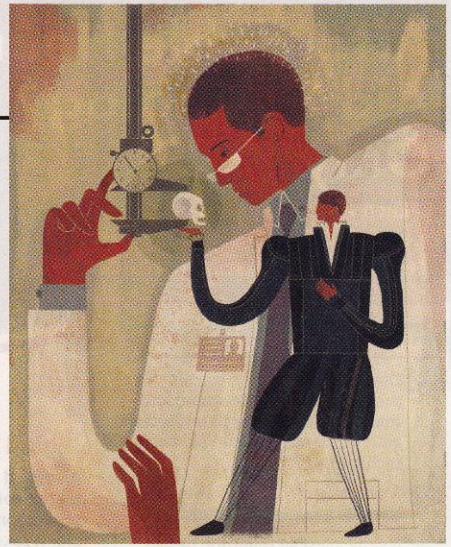
$5 \times 3 = 15$

Multiplication > Addition

Science Is Not Enough

Politicians trying to dump humanities education will hobble our economy

By the Editors



Kentucky governor Matt Bevin wants students majoring in electrical engineering to receive state subsidies for their education but doesn't want to support those who study subjects such as French literature. Bevin is not alone in trying to nudge higher education toward course work that promotes better future job prospects. Senator Marco Rubio of Florida, a former presidential candidate, put it bluntly last year by calling for more welders and fewer philosophers.

Promoting science and technology education to the exclusion of the humanities may seem like a good idea, but it is deeply misguided. *Scientific American* has always been an ardent supporter of teaching STEM: science, technology, engineering and mathematics. But studying the interaction of genes or engaging in a graduate-level project to develop software for self-driving cars should not edge out majoring in the classics or art history.

The need to teach both music theory and string theory is a necessity for the U.S. economy to continue as the preeminent leader in technological innovation. The unparalleled dynamism of Silicon Valley and Hollywood requires intimate ties that unite what scientist and novelist C. P. Snow called the "two cultures" of the arts and sciences.

Steve Jobs, who reigned for decades as a tech hero, was neither a coder nor a hardware engineer. He stood out among the tech elite because he brought an artistic sensibility to the redesign of clunky mobile phones and desktop computers. Jobs once declared: "It's in Apple's DNA that technology alone is not enough—that it's technology married with liberal arts, married with the humanities, that yields us the result that makes our hearts sing."

A seeming link between innovation and the liberal arts now intrigues countries where broad-based education is less prevalent. In most of the world, university curricula still emphasize learning skills oriented toward a specific profession or trade. The ebullience of the U.S. economy, which boasted in 2014 the highest percentage of high-tech outfits among all its public companies—has spurred countries such as Singapore to create schools fashioned after the U.S. liberal arts model.

If Bevin and other advocates of a STEM-only curriculum look more closely, they will find that the student who graduates after four years of pursuing physics *plus* poetry may, in fact, be just the kind of job candidate sought out by employers. In 2013 the Association of American Colleges & Universities issued the results of a survey of 318 employers with 25 or more employees showing that nearly all of them thought that the ability to "think critically, communicate clearly, and solve complex problems"—the precise objectives of any liberal arts education—was more important than a job candidate's specific major.

Those same skills, moreover, are precisely the ones required for marrying artistic design with the engineering refinements needed to differentiate high-end cars, clothes or cell phones from legions of marketplace competitors—the type of expertise, in fact, that is least likely to be threatened by computers, robots and other job usurpers. "Consider America's vast entertainment industry, built around stories, songs, design and creativity," wrote commentator Fareed Zakaria, author of the book *In Defense of a Liberal Education,* in a *Washington Post* column. "All of this requires skills far beyond the offerings of a narrow STEM curriculum."

The undergraduate able to cobble together a course schedule integrating STEM and the humanities may be able to reap rich rewards. Facebook co-founder Mark Zuckerberg became an avid student of Greek and Latin when he was only in high school, in addition to setting about learning programming languages. And the same government officials who call for a shift in educational priorities should know better than to trash the liberal arts. Take Bevin's call to eschew French literature: Bevin is someone with his own debt to the humanities. He graduated from college with a bachelor's degree in East Asian studies.

The way to encourage high-tech industry to move to Kentucky—or any other state—is not to disparage Voltaire and Camus. Rather the goal should be to build a topflight state educational system and ease the way financially for students from even the most humble backgrounds to attend. The jobs will follow—whether they be in state government or in social media start-ups.

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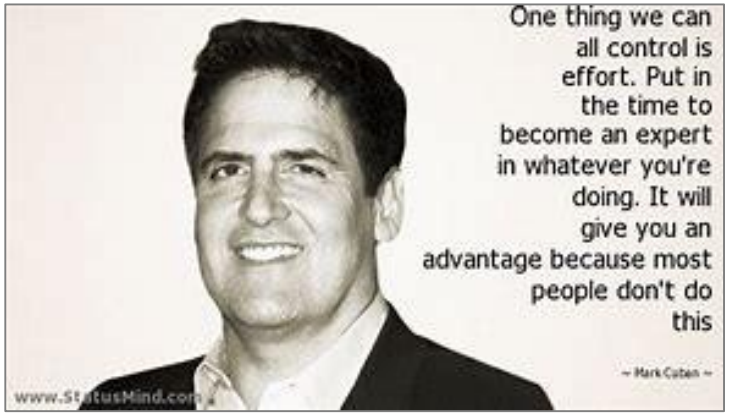
Illustration by Nicolas Ogonosky

Mark Cuban

Born 1958, American businessman, investor, author, television personality, philanthropist, Dallas Mavericks owner; net worth 3.4 billion USD

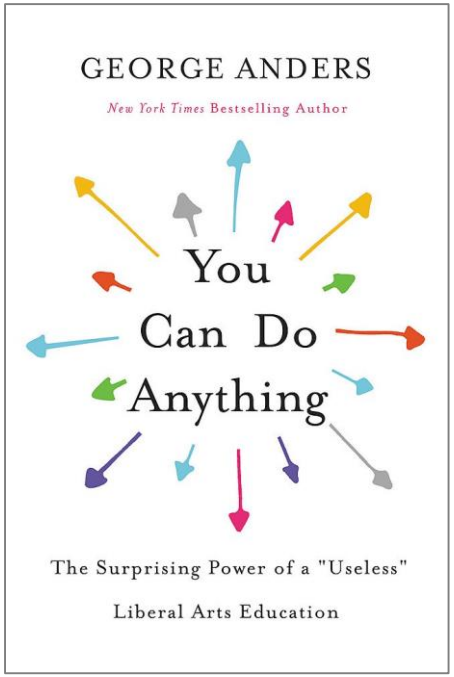
Time interview: The No.1 Job Skill in 10 Years



- Millions of jobs will become automated in coming years (AI/robots)
- Even people with in-demand skills like computer coding could soon be displaced
- Nature of work is changing — we're going to have a lot of displaced workers
- Creative thinking — a new skill becoming more in-demand than it ever has been
- Liberal arts majors — greater demand in 10 years, more than for programming or engineering majors
- Experts in philosophy or foreign languages will ultimately command the most interest from employers in the next decade (too complex for AI)

http://time.com/money/4676298/mark-cuban-best-job-skill/ (170221)

More jobs in liberal arts with "science" knowledge



2017

- 2012-2016, 101 million jobs created in USA; only 5% are related to computers (10% if internet jobs are included), the rest are liberal arts related, i.e., skills involving interaction with humans
- Someone with Chinese language degree from Stanford hired immediately by Google upon graduation
- An anthropology major, good at listening to people with different cultural backgrounds, thrived in own company in computer-human interface
- Examples of Humanities x "Science" :
  - Curiosity + big data = marketing
  - Empathy + DNA sequencing = DNA consultation
  - Literary curiosity = managing social networks

Liberal arts provide skills in solving complex problems involving humans—an education in critical thinking

Liberal arts degree with technical knowledge or engineering degree with liberal arts education is mostly wanted in today's and tomorrow's job market

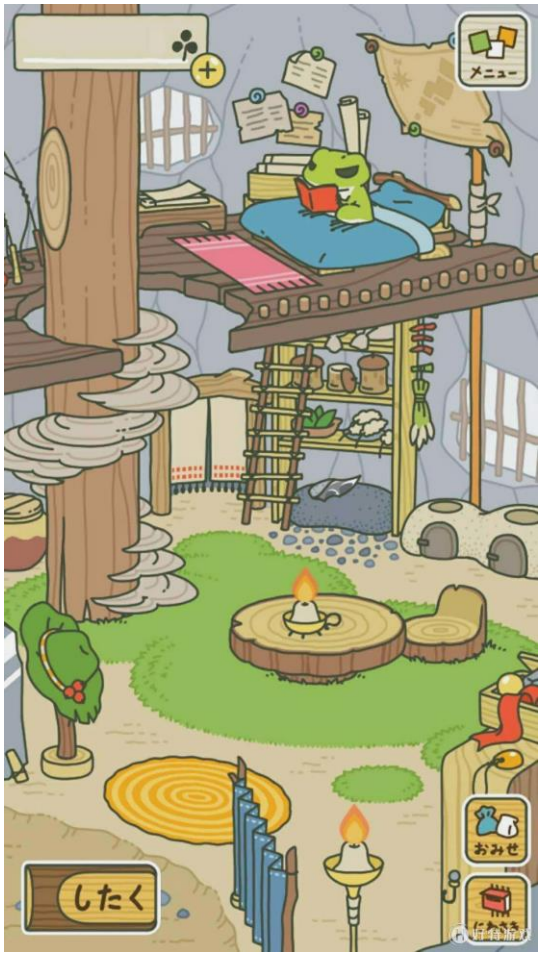
Innovation from Humanities x “Science”

Kaeru B Back

《旅かえる》 Frog Be Back

《青蛙回家》

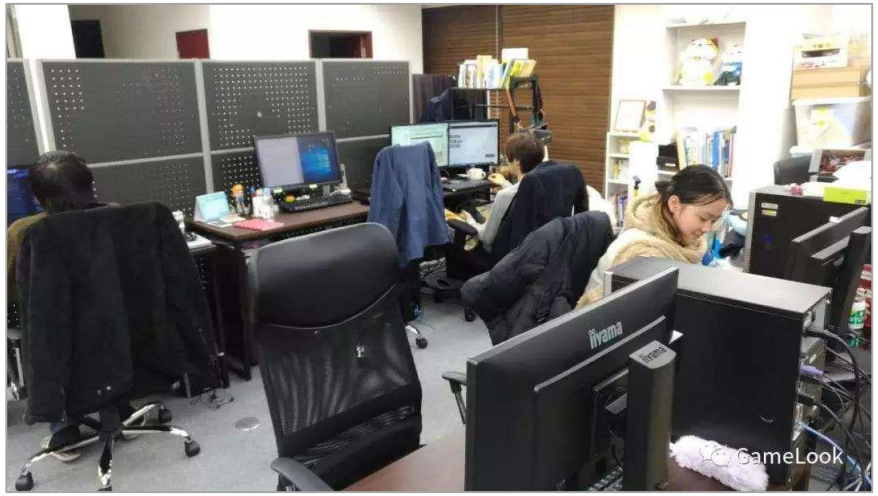
- A role-playing game (RPG), red hot in China in Jan. 2018
- Frog lives at home, leaving and coming back at will, which players can’t control (like a rebellious, teenage son or a lousy husband)
- Players just wait or send postcards but can encourage him to come home by putting food on table, etc.



Creator 上村真裕子

- Invented by a Japanese woman 上村真裕子
- Producer, team of 4, Hit-Point Workshop (26 people)
- It took 10 months from concept to distribution
- In Apple app store, 95% download from China; only 1% from Japan
- In two months, 22 million downloads (including unauthorized Chinese-language copies, called Traveling Frog 旅行青蛙)

Success reason: resonant with people's feelings
—a humanities skill



Why Innovations Are Hard to Come By in China

1. The Chinese Culture

A. Challenging authorities was never in the Chinese tradition

- Harmony is supreme !
- It comes from the Chinese culture of “the middle road” (中庸之道)

  which is good in stabilizing the society

  but bad for innovation

B. Seeking truth was never the priority in China’s long history

- *Weiwen* (维稳 maintaining stability) is top priority !
- Seeking truth (the basic tenet of innovation) could inconvenient weiwen

2. Only Two Persons in China Had Done Great Innovations

Yang Zhenning (C. N. Yang)
Born 1922
In China since 2003
Nobel Prize in physics 1957
Aged 96

Tu Yaoyao
Born 1930
In China since 1930
Nobel Prize in physiology or medicine 2015
Aged 88

3. And there are the 3 obstructive "mountains"

The 333 on China's Road to Innovation

in Basic Science

3 Obstructive “Mountains”

1. Counting Papers

China's physics leaders before 1986

Yan Jici
1901-1996
PhD France

Shi Ruwei
1901-1983
PhD USA

Guan Weiyan
1928-2003
PhD USSR

1986

2002 Centenary

Physics Dept., Nanjing University
started counting papers

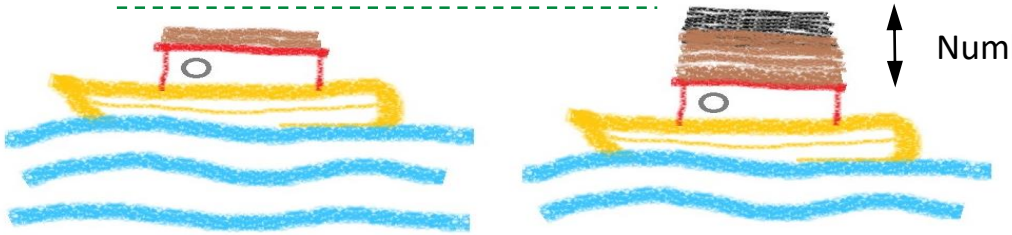
The originator

Gong Changde (1932-)
1953 BS (equivalent)
Fudan University
1986 Chair, Phys. Dept.,

Counting Papers and Innovation

Boat higher, water lower

Nothing to do with innovation



Can innovate

Soothing
Reasonable number of papers

Paper & Wine

Alcoholic
Too many papers

Can't innovate

Drunk with poison wine
Fraudulent papers

2. Never Ending Assessment of Scientists

- In the 1980s, after the Cultural Revolution (1966-1976), China abolished the tenured system ("iron bowl")
- And run the academic institutes and universities like an IBM company (no guaranteed employment, review everybody yearly)
- While assessment data are used as reference for decision makers in other countries, China's administrators use them directly in deciding salary increases and promotions
- Also, income for researchers comes from three sources: basic salary, administrative salary, and grant money. (The basic salary is only about 1/3 of income which can hardly support living.)

3. Outdated Graduate School Schemes

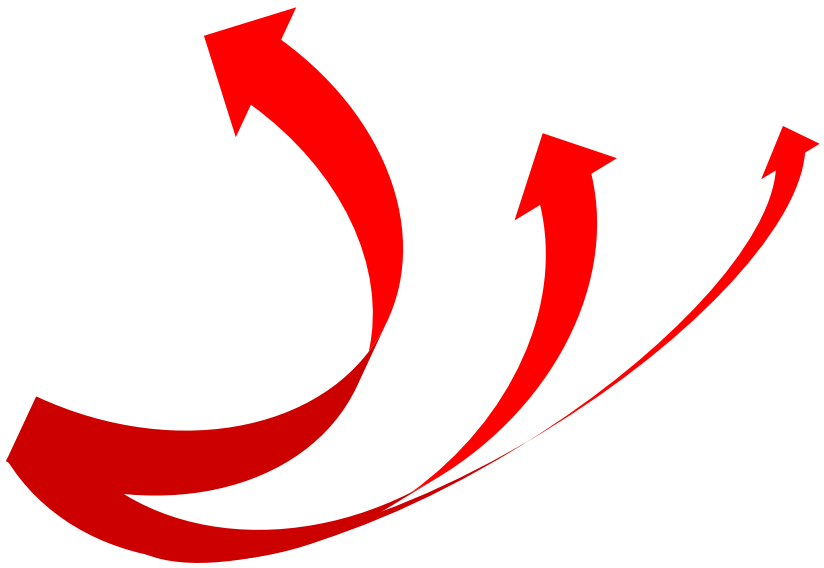
Graduate schools

China	United States
Master degree before PhD (exceptions rare and need approval)	Common to go directly to PhD without going through master degree
For both master and PhD programs, the applicant has to pick a mentor first	Commonly, no master degree thesis; PhD first year take courses; pick mentor by mutual agreement after passing matriculation exam at end of 1st year
A graduate school mentor could supervise 30 or more students at same time (since sudden expansion in 1999)	A few graduate students at most at the same time (e.g., at Harvard, Zhuang Xiaowei's large group has 12 graduate students, all for PhD, but 13 postdocs)

Problems:

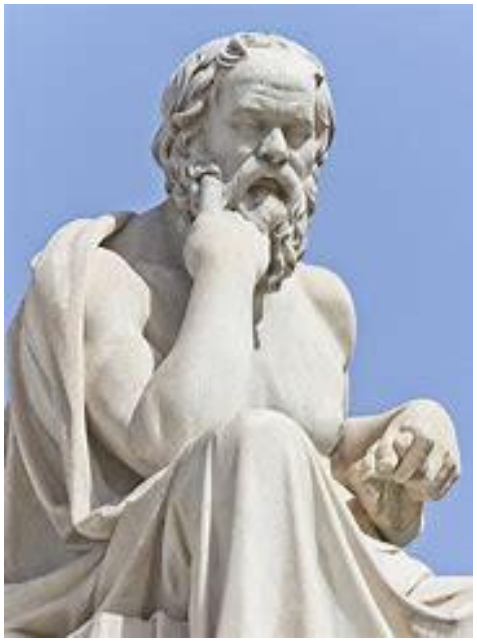
- Mentors' have too much power over students' fates (leading to tragedies)
- Too many students, not enough time to innovate

3 Historical Approaches in Innovation



1. The Ancient Greek Approach

Yang Zhenning



Socrates
c. 470 – 399 BC

- Ask questions, any question
- Keep on asking why (Socratic method)
- Do it for curiosity, for fun
- Maximal freedom in enquiry
- Maximal exchange of information

Possible only in a "free" society !

- Advantage: Innovations flourish
- Adopted in Western countries
- Unsuitable for countries where Google Scholar is inaccessible

2. The Chinese Approach

Tu Yaoyao

- 1967, amid the Cultural Revolution, Chair Mao Zedong authorized a crash program (a secret military project) to tackle malaria, upon the request from the Vietnamese
- 1971 Tu Yaoyao, then 41, inspired by traditional Chinese medicine literature, succeeded in discovered artemisinin (Qing-hao-su in Chinese)
- It's a drug that has significantly reduced the mortality rate for malaria patients
- The discovery and its use in treating malaria are regarded as a significant breakthrough in tropical medicine in the 20th century
- 2015 Tu won the Nobel Prize in physiology or medicine

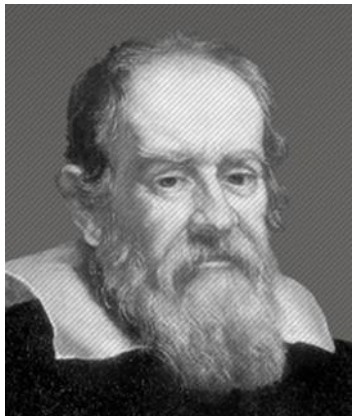
Problems:

- It happened only once in history
- The goal was preset
- It involves a lot of women/men power and huge resources (like fighting a war)

3. The Vatican Approach

Galileo: father of modern science

- End of Renaissance period in Italy
- The Vatican controlled everything:
  ideology (Catholicism), society, universities



Galileo Galilei
1564-1642

His middle finger

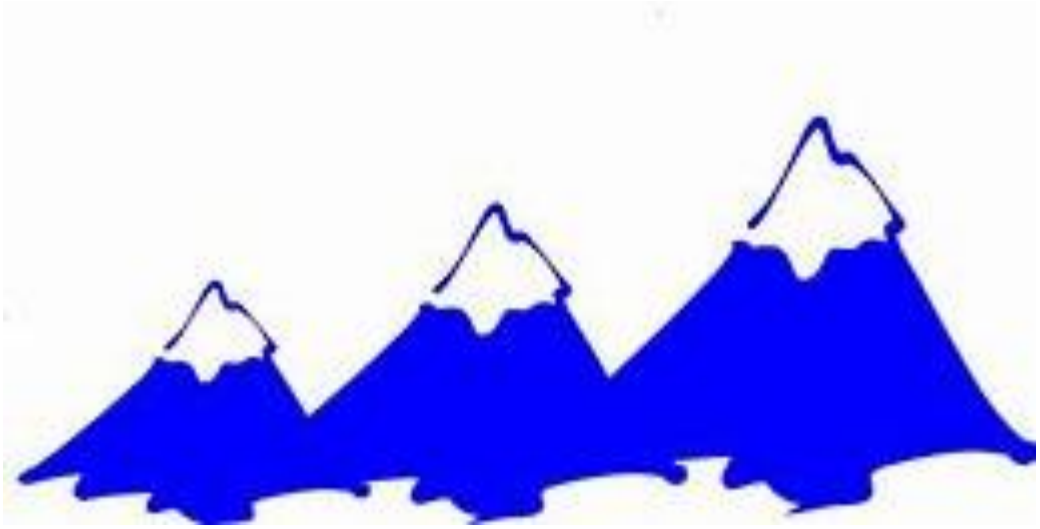
Education/Employment

- 1580, U. of Pisa, study medicine, switch to math and natural philosophy
- 1585, dropout from U of Pisa; work as tutor
- 1588, instructor, Accademica delle Arti del Disegno (Florence), teaching perspective and chiaroscuro; applied for math chair at U of Bologna but failed.
- 1589-1592 (3 yr), math chair, U of Pisa
- 1592-1610 (9 yr), math prof., U. of Padua, teach geometry, mechanics, astronomy
- 1610 (aged 46), tenure, U of Padua, math position

Why successful

- Galileo was free to choose research topics
- Tenured after 12 years (in 2 universities)
- No one counted his papers
- Intense debates (got into trouble when opponents were also powerful political figures)

3 Solutions



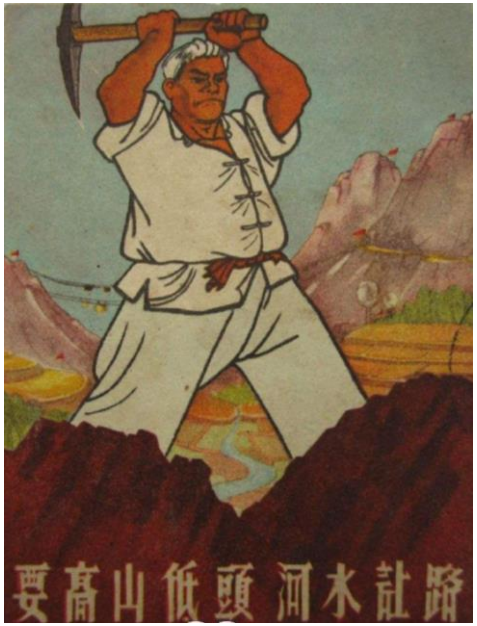
The unique Chinese condition

Constitution of the People's Republic of China, Article 36 contains this:

The defining feature of socialism with Chinese characteristics is the leadership of the Communist Party of China.

1. Remove the Mountains

- The 3 obstructive “mountains” were self-created (for historical reasons) and thus could be removed by self-actions
- Change the educational system (need action of Ministry of Education only)
- Easier said than done (no one dares to initiate it)



2. Go Around the Mountains

How nature does it

How humans do it

Build new private universities

2016 Westlake Institute for Advanced Study

2018 Westlake University

3. Tunneling Through the Mountains

One university, two systems

- Scientific innovations won't challenge the social system; humanities/social science innovations could
- Thus, School of Science (nonhuman systems) and School of Humanities/Social Science (humans) in a university should be governed with different rules
- For School of Science, adopt the Vatican approach and give science faculties tenures, don't count papers, no yearly assessments, etc.

NB: "1 x, 2 systems" is very common in China. Why not in universities?

Consequences

- Won't guarantee success in innovation
- Just cutting the ropes that bind scientists' "feet" (so they can run and compete freely and equally in innovation)
- Successful innovations need something more (picking research topics, guidance, role models…)

Conclusion

- General education should be mandatory and strengthened in universities (to avoid the danger of breaking science ethics, e.g.)
- Blending humanities and science will promote/lead to innovations
- Adopting the Vatican approach in scientific innovation in China should be considered (meaning "one university, two systems")
- Otherwise, invent the 4th approach in innovation
- Revise the graduate school schemes (students pick departments, not specific mentors, upon applying)

Take Home Message

L O V E
WISDOM
L O V E
FREEDOM

Humanities x "Science" → Innovation

Lui LAM (林磊)

San Jose State University, San Jose, California

The title is first explained. It involves the correct definition of Science, why there are quotation marks, and the proper relationships between the humanities and science. And why and how when the two are synthesized or merged it will promote and even lead to innovation—something China recognizes she needs urgently. We then explain why innovations are so hard to come by in present China. To overcome that, "The 333 on China's road to innovation" is presented, viz., three kinds of successful approach in innovation in science history, three obstructive "mountains", and three solutions.

Lui LAM, humanist and physicist, is professor at San Jose State University, California, and guest professor at Chinese Academy of Sciences and China Association for Science and Technology. Education: BS (First Class Honors), University of Hong Kong; MS, University of British Columbia; PhD, Columbia University. Worked in USA, Europe (Belgium, West Germany), China (Inst. of Physics, CAS, Beijing, 1978-1983). Invented Bowlics (1982), Active Walks (1992) and two new disciplines: Histophysics (2002) and Scimat (Science Matters, 2007/2008). Published over 180 papers and 16 books, including *Arts* (2011) and *All About Science* (2014). Founder of International Liquid Crystal Society (1990); founder and editor of two book series: Science Matters (World Scientific) and Partially Ordered Systems (Springer). Current research: philosophy and complex systems. Website: www.sjsu.edu/people/lui.lam/scimat. **Email**: lui2002lam@yahoo.com.

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