When Science Fails

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摘要1: 本讲座考察科学的历史和特征，说明科学有可能导致自然和社会的灾难。介绍什么时候科学会失败，为什么科学会失败。从系统的复杂性及不确定性, 推演逻辑的适用性，事实的表象性，生物随时间的进化性及认知空间的差异性等各方面阐述科学的局限性。并指出不科学的方法（如定性分析,归纳法）在非理工科领域，如经济、金融、管理等十分复杂的系统中被普遍采用,成为有效的研究方法。本讲座主体由三个部分组成：

1. 正信的科学,
2. 迷信的科学,
3. 兼信的学术。

I. INTRODUCTION: Background

- 反对中医，否定中医，废除中医. 由来已久，今日更甚！
  TCM is not scientific, not true, wrong. TCM looks even absurd and superstitious
- 何祚庥：理论物理教授，<中医须接受现代科学改造>, 2010-03-23辽宁日报. Widely available on internet.
- 何(理论物理)教授,“我不是医学专家，但中医的问题绝对不是简单的医学问题，也不仅是中医、西医之间的争论。中医问题其实是科学和不科学或伪科学之间的争论，也涉及到哲学命题的争论，涉及唯心论和唯物论之间的争论。从这个角度讲，我还是有发言权的。”
- 何(理论物理)教授,“按照唯物论的观点和学说来衡量中医，中医的理念和方法，和现代科学背道而驰，也和辩证**唯物论**的理念和方法背道而驰”

何祚庥：中医须接受现代科学改造

辽宁日报　　2010-03-23

“我不是医学专家，但中医的问题绝对不是简单的医学问题，也不仅是中医、西医之间的争论。中医问题其实是科学和不科学或伪科学之间的争论，也涉及到哲学命题的争论，涉及唯心论和唯物论之间的争论。从这个角度讲，我还是有发言权的。”

“按照唯物论的观点和学说来衡量中医，中医的理念和方法，和现代科学背道而驰，也和辩证唯物论的理念和方法背道而驰。中医‘如果愿意接受现代科学改造’，可能会有一些药物或治病的方法，可吸收到现代医学体系之中，但改造难度不小。”“据我所知，现代药物学家，就很少愿意从事中药的提炼、疗效及其副作用的研究，原因是成分太多，太复杂，很难研究清楚，做出确切的结论，用我们的术语说，是很难做‘干净’的科学研究，当然也就很难做出成绩。”

I. INTRODUCTION: Background

- Yes,中医 (TCM) is a big issue!
- 凡事讲科学，泛科学化，把科学摆到至高无尚的位置,顶礼膜拜.
- Science＝everything, science＝the criterion, science＝the truth
- 科学是否变成了迷信？ Science is a bubble?

I. INTRODUCTION: My View

- 本讲座: 支持中医,力挺中医， 振兴中医
- TCM is Not scientific, but it is Valid
- TCM is valuable due to its non-scientific methodologies
- 科学非万能的灵丹妙药
- 反对 对科学的迷信
- Promote TCM and all non-scientific subjects, which is important and urgent

Long Term Capital Management fund

CNN
September 23, 1998

Hedge fund gets help

September 23, 1998: 8:42 p.m. ET

Long-Term Capital in pact for infusion after trading strategies result in losses

NEW YORK (CNNfn) - Long-Term Capital Management, a renowned hedge fund that is considered Wall Street's "Dream Team," late Wednesday reached a $3.5-billion bailout agreement with its principal lenders to stay afloat.

The bailout puts an end to speculation the hedge fund -- started in 1994 by former Salomon Brothers trading legend John Meriwether as well as two Nobel laureates -- would need to liquidate billions of dollars of investments to meet minimum capital requirements.

The New York Times
September 24, 1998

THE MARKETS; Seeing a Fund as Too Big to Fail, New York Fed Assists Its Bailout

By GRETCHEN MORGENSON
Published: September 24, 1998

The Federal Reserve Bank of New York has helped organize the rescue of a large and prominent speculative fund, indicating that regulators recognize that the failure of such a fund would damage already fragile world markets.

Under an agreement reached late yesterday, the fund, Long-Term Capital Management L.P. of Greenwich, Conn., received a cash infusion of more than $3.5 billion from a consortium of commercial banks and investment firms. The fund, whose founder is John Meriwether, a former vice chairman of Salomon Inc., and whose partners included two Nobel prize winners, is said to be have a portfolio worth $90 billion.

The deal came after representatives of 16 banks and brokerage houses met at the offices of the Federal Reserve Bank of New York in downtown Manhattan. It is extremely unusual for the Federal Reserve to get involved in the bailout of such a fund, known as a hedge fund, a virtually unregulated type of investment firm, which despite its name, speculates in high-risk trades in markets around the world.

Robert C. Merton

Born: 31 July 1944, New York, NY, USA

Affiliation at the time of the award: Harvard University, Cambridge, MA, USA

Prize motivation: "for a new method to determine the value of derivatives"

Field: Financial economics

Contribution: Had a direct influence on the development of the Black-Scholes formula and generalized it in important ways. By devising another way of deriving the formula, he applied it to other financial instruments, such as mortgages and student loans. The work generated new financial instruments and has facilitated more effective risk management in society.

Myron S. Scholes

Born: 1 July 1941, Timmins, ON, Canada

Affiliation at the time of the award: Long Term Capital Management, Greenwich, CT, USA

Prize motivation: "for a new method to determine the value of derivatives"

Field: Financial economics

Contribution: Developed a method of determining the value of derivatives, the Black-Scholes formula (together with Fischer Black, who died two years before the Prize award). This methodology paved the way for economic valuations in many areas. It also generated new financial instruments and facilitated more effective risk management in society. The work generated new financial instruments and has facilitated more effective risk management in society.

- Long Term Capital Management fund, combination of top practitioners and academicians such as Drs. Merton and Scholes who are Nobel prize winners
- Roger Lowenstein, <<When Genius Failed: The Rise and Fall of Long Term Capital Management>>
- Science failed the market
- Roger Lowenstein, <<Making of a American Capitalist>>

I. INTRODUCTION: My Approach

- Definition of science, its framework and elements
- Classification of systems
- Division of science and non-science

I. INTRODUCTION: Derivatives

- Science is only one of many methodologies
- Science is NOT the criterion for accepting or rejecting other methodologies; but it competes with them
- Science is NOT the truth but a way to seek it

II. 正信的科学: Definition of Science

Different definitions/views on science

Academic Press Dictionary of Science & Technology

1. the systematic observation of **natural events** and conditions in order to discover facts about them and to formulate laws and principles based on these facts.
2. the organized body of knowledge that is derived from such observations and that can be verified or tested by further investigation.
3. any specific branch of this general body of knowledge, such as biology, physics, geology, or astronomy.

II.正信的科学: Definition of Science

WHAT IS SCIENCE: http://www.gly.uga.edu/railsback/railsback_1122science1.html

Science is the concerted effort by very real human beings to understand the history of the **natural world** and how the natural world works. Observable physical evidence, either from observations of nature or from experiments that try to simulate nature, is the basis of that understanding. The results of, and inferences from, those observations and experiments become scientific knowledge only after publication, and the point of publication is to change previous ideas. Thus theories, the large-scale concepts that are based on huge amounts of data and try to explain and predict large bodies of phenomena, may be powerful ideas, but they are constantly subject to revision or even rejection as new knowledge emerges. The result is that scientific knowledge is constantly changing but hopefully proceeding toward a more correct view of the world.

II.正信的科学: Definition of Science

http://wapedia.mobi/en/Science#3:

- A scientific method seeks to explain the events of nature in a reproducible way, and to use these reproductions to make useful predictions. It is done through observation of natural phenomena, and/or through experimentation that tries to simulate natural events under controlled conditions. It provides an objective process to find solutions to problems in a number of scientific and technological fields
- Based on observations of a phenomenon, a scientist may generate a model. This is an attempt to describe or depict the phenomenon in terms of a logical physical or mathematical representation. As empirical evidence is gathered, a scientist can suggest a hypothesis to explain the phenomenon. This description can be used to make predictions that are testable by experiment or observation using scientific method. When a hypothesis proves unsatisfactory, it is either modified or discarded.

II.正信的科学: Definition of Science

Science is

- a research framework/methodology,
- the knowledge which is derived from it, and
- the subjects to which it is applicable, mainly natural systems

II.正信的科学: Characterization

- **Creation of theory**
  - Model (often micro-level)
  - Law/axiom
  - logic reasoning=Deduction (often with integration)
  - Theorems

  Must be well defined, quantified, measured, consistent

- **Verification of theory (and Application)**
  - Make experimental set up (assumptions) to fit to the model
  - Employ theorems to predict outcomes
  - Do experiment to verify the outcomes

  Must be objective, repeatable, independent of researchers

还原法 **Reductionism**

II. 正信的科学: Characterization

- Model/Law
- **Deductive reasoning is an integral part of science;演绎法**：应用一般陈述（或公理定律定理原理）导出特殊陈述或从一种陈述导出另一种陈述的方法.《几何原本》仅由五个公理就演绎出一本厚书，而把其中第五公设变了变，又演绎出《黎曼几何》,…
- Inductive reasoning is not scientific. 归纳法：将特殊陈述上升为一般陈述（或定律定理原理）的方法.完全和不完全归纳法; 科学归纳法和简单枚举法.归纳法>简单枚举法> not scientific. One counterexample kills a theorem.
- 能够重复的科学试验; non-repeatable, or non-objective is not scientific

II. 正信的科学: Characterization

http://baike.baidu.com/view/326184.htm

- **公理/axiom :** 在傳統邏輯中，**公理**是無法被證明或決定對錯，但被設為不證自明的一個命題。因此，其真實被視為是理所當然的，且被當做演繹及推論其他（理論相關）事實的起點。當不斷要求證明時，因果關係毕竟不能無限地追溯，而需停止於無需證明的公理。通常公理都很簡單，且符合直覺。

- **公理系统/axiomatic system:** 在数学上，一个公理系统(或称公理化系统，公理体系，公理化体系)是一个公理的集合，从这些公理可以逻辑地导出所有的定理。也可以说，公理系统是形式逻辑的一个完整体现。一个数学理论系统是由一个公理系统和所有它导出的定理组成的。比如：欧几里德《几何原本》中就规定了五条公理，平面几何中的一切定理都可由这五条公理和公设推得。**由于公理系统可以建造一个完整的、无矛盾、满足一致性的理论体系，所以几乎所有的数学领域甚至一些数学以外的科学领域也采用了公理化体来构造他们的理论系统。**

II. 正信的科学: Existence

There are basic philosophical assumptions implicit at the foundation of science —

1) that reality is objective and consistent,

2) that rational explanations exist for working of reality, and

3) that humans have the capacity to perceive and comprehend reality accurately.

II. 正信的科学: Example

- The best representation of science is physics
- Model: rigid body
- Law: Newton's 3 laws (not theorems)
- Reasoning: sole deduction, no induction; The whole is sum of individuals (integration).
- Theorems: consistency, no conflict
- Experiments: repeatable
- Assumptions: valid unless too small or too fast

II. 正信的科学: Counterexamples

- Engineering is a science? No; theory part is yes; design, practice is not
- Religion is not a science. no proof of god's existence
- Democracy is not a science. irrelevance of majority
- Art is not a science; beauty is subjective

II. 正信的科学: Counterexamples

- Economics is not a science. Paul Samuelson's book. Nobel prize winner
- "... [this economic condition] has been brought about by policies which the majority of economists recommended and even urged governments to pursue. We have indeed at the moment little cause for pride: as a profession we have made a mess of things." - Friedrich August von Hayek, Nobel Speech 1974

II. 正信的科学: Counterexamples

- Management is not a science
- Social study is not a science: no universal model, law, theorem
- Human behavior: non-scientific making; Emotion, Love and Marriage are non-scientific; “男女之间的爱情，没有输赢可讲，没有道理可陈！

II. 正信的科学: Medicine is not a science

- Medicine is not a science; In particular,西医/modern western medicine (MWM) is not a science
- Theoretically
  - No model/law. Absolutely no for mind
  - No theorems
  - Non-repeatability of experiment as each individual is different
- Practically
  - Emphasis on clinic experience
  - If MWM were a science, then each doctor would apply the same theory and obtain the same conclusion and outcomes; then all doctors would be of equal standard
- MWM is half science and half art at best. half science is not science.生理基本科学; 心理基本不科学; 制药过程基本科学， 治病过程则不然
- Will be science? Unlikely, mind can be against any law/rule. 人的主动思考及行动能使任何定律/规则失效

II. 正信的科学: Conclusions

- Science is applicable and successful to natural systems, but limited to human body and society
- Mind is common to human body and society and the essence of all non-scientific subjects
- Soft sciences VS hard sciences
- The highly educated believe in science only? Not really, Newton and Einstein
- Remark: Science is evolutionary. Expand science framework to include others? Then, why not expand non-science to include science; each should have and keep its characteristics

III.迷信的科学

- What is 迷信? 反对科学迷信
- Further development makes non-scientific subjects scientific? But they are old subjects
- What are systems and features which science is hard/unable/unpractical to solve, and may cause great damage sometimes if science is blindly applied
- Though MWM is not a (complete) science, but use of science makes it strong; TCM is weak because of lack of use of science; YES!!!
- 中医科学化,西医化? Limitations of science, Protection of TCM and non-scientific subjects

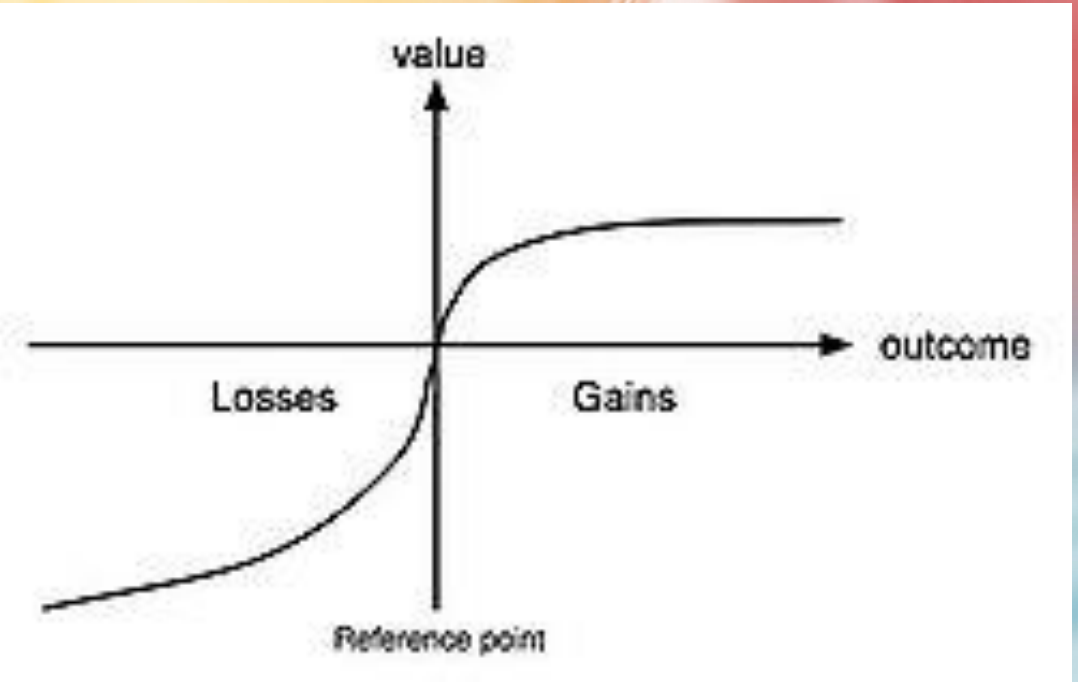
III.迷信的科学: 唯定量

- TCM is qualitative; thus not accurate while MWM is quantitative, accurate, thus better.
- Quantitative analysis is scientific while qualitative analysis is not
- Yes, but qualitative analysis may be inevitable and useful in many complex cases
- Economics: supply-demand
- Supply changes to demand and vise versa
- Yin-Yang＝TCM
- Yin changes to Yang

III.迷信的科学: 唯定量

- Prospect theory >>> Behavior finance
- The Uncertainty Principle
- Control system: zero-tracking error, illusion.
- PID control

III.迷信的科学: 唯定量



III.迷信的科学: 唯定量

Prospect theory

- Its novelty: utility function: convex; value function: concave for loss and convex for gain. risk-seeking behavior in losses, gambling to bankruptcy
- It was developed by Psychologists, Daniel Kahneman and Amos Tversky in 1979 as a realistic alternative to expected utility theory in the general field of judgment and decision-making. Kahneman was awarded the Nobel Memorial Prize in Economics in 2002 for his work on prospect theory. Heuristic in nature

Daniel Kahneman

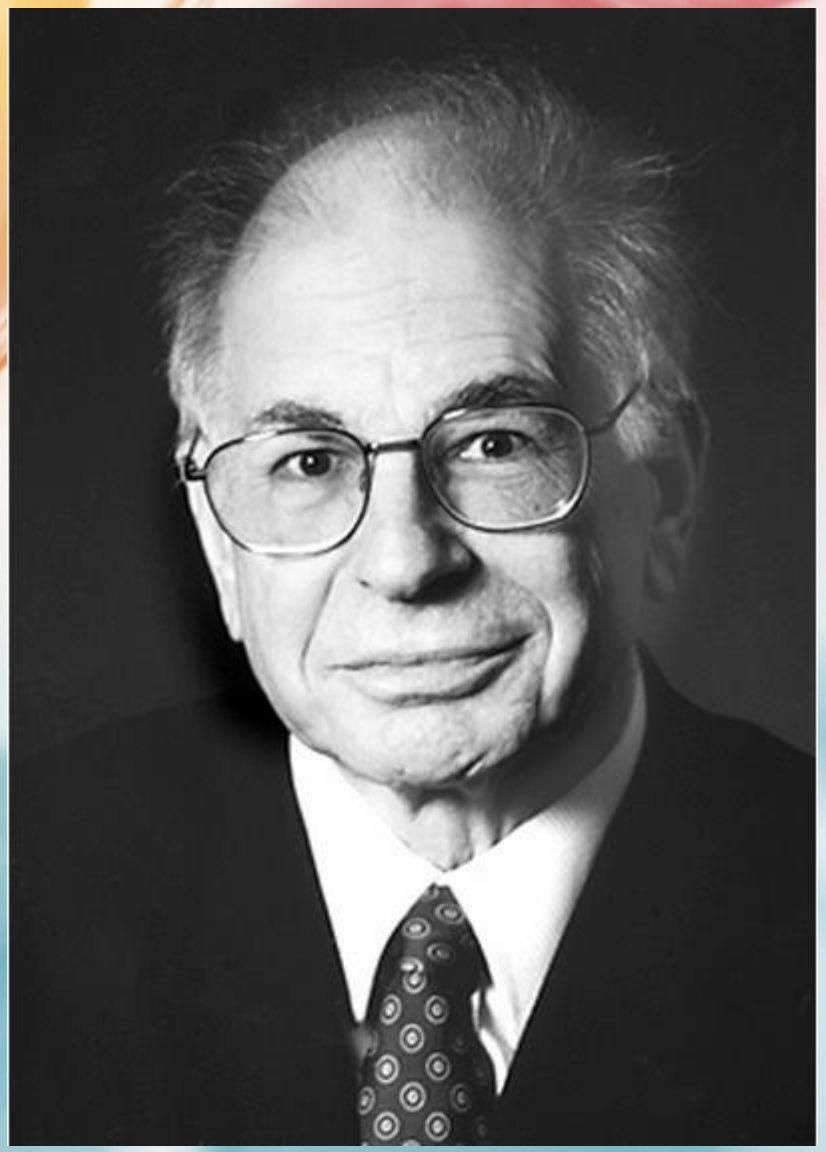
Born: 5 March 1934, Tel Aviv, British Mandate of Palestine (now Israel)

Affiliation at the time of the award: Princeton University, Princeton, NJ, USA

Prize motivation: "for having integrated insights from psychological research into economic science, especially concerning human judgment and decision-making under uncertainty"

Field: Economic psychology and experimental economics

Contribution: Integrated economic analysis with fundamental insights from cognitive psychology, in particular regarding behavior under uncertainty, thereby laying the foundation for a new field of research.



The Uncertainty Principle

The position and momentum of a particle cannot be simultaneously measured with arbitrarily high precision. There is a minimum for the product of the uncertainties of these two measurements. There is likewise a minimum for the product of the uncertainties of the energy and time.

$$\Delta x \Delta p > \frac{\hbar}{2}$$

$$\Delta E \Delta t > \frac{\hbar}{2}$$

This is not a statement about the inaccuracy of measurement instruments, nor a reflection on the quality of experimental methods; it arises from the wave properties inherent in the quantum mechanical description of nature. Even with perfect instruments and technique, the uncertainty is inherent in the nature of things.

Werner Heisenberg

III.迷信的科学: 唯定量

- Quantification may be not possible beyond some point. Noise, uncertainty, complexity
- Quantitative analysis does not necessarily mean accuracy
- Qualitative analysis is better than nothing, fast way, sometimes the only way to understand unless effective quantification is verified

III.迷信的科学: 唯演绎

- TCM is empirical while MWM does not seem so
- Deduction is scientific while induction is not
- Yes, but induction based on empirical data is inevitable in many cases
- History/Economy
- Medicine/TCM
- Is History a valid subject? If yes, so is TCM

III.迷信的科学: 唯演绎

- An operation > is transitive if A>B and B>C,then A>C
- All accepted mathematical and scientific systems have transitivity. Transitivity is necessary to have consistent theory.
- Numerical level: 8>5>2, then 8>2.
- A is a superset of B, B is a superset of C; then A is a superset of C.
- Condition A implies Condition B, Condition B implies Condition C. Then Condition A implies Condition C.
- Controllability > pole placement > stabilizability; Then Controllability > stabilizability

III.迷信的科学: 唯演绎

- Consider a set of all vectors, x=[a,b,c], define x1>x2 elementwise. Then, this operation is transitive
- But define a new operation on X, x1>x2 if x1 has two or three elements greater than those of x2. look at

  X1=[3, 4, 2]

  X2=[2, 3, 4]

  X3=[4, 2, 3]

  x1>x2 and x2>x3, but x1>x3 does not hold; this operation is not transitive! In fact x3>x1,
- Sports games/decision making have the above feature.

The **Allais paradox** is a choice problem designed by Maurice Allais to show an inconsistency of actual observed choices with the predictions of expected utility theory.

Experiment 1				Experiment 2			
Gamble 1A		Gamble 1B		Gamble 2A		Gamble 2B	
Winnings	**Chance**	**Winnings**	**Chance**	**Winnings**	**Chance**	**Winnings**	**Chance**
$1 million	100%	$1 million	89%	Nothing	89%	Nothing	90%
		Nothing	1%	$1 million	11%		
		$5 million	10%			$5 million	10%

Experiment 1				Experiment 2			
Gamble 1A		Gamble 1B		Gamble 2A		Gamble 2B	
Winnings	**Chance**	**Winnings**	**Chance**	**Winnings**	**Chance**	**Winnings**	**Chance**
$1 million	89%	$1 million	89%	Nothing	89%	Nothing	89%
$1 million	11%	Nothing	1%	$1 million	11%	Nothing	1%
		$5 million	10%			$5 million	10%

Let the utility function be u(W), where W is wealth. Because the typical individual prefers 1A to 1B and 2B to 2A, the expected utility of the former is greater than the expected utility of the latter, implying from Experiment 1 that

$$1.00U(1m) > 0.89U(1m) + 0.01U(0) + 0.1U(5m)$$

from Experiment 2 that

$$0.89U(0) + 0.11U(1m) < 0.9U(0) + 0.1U(5m)$$

which can be rewritten as

$$0.11U(1m) < 0.01U(0) + 0.1U(5m)$$

$$1.00U(1m) - 0.89U(1m) < 0.01U(0) + 0.1U(5m)$$

$$1.00U(1m) < 0.89U(1m) + 0.01U(0) + 0.1U(5m)$$

which contradicts the first bet (Experiment 1).

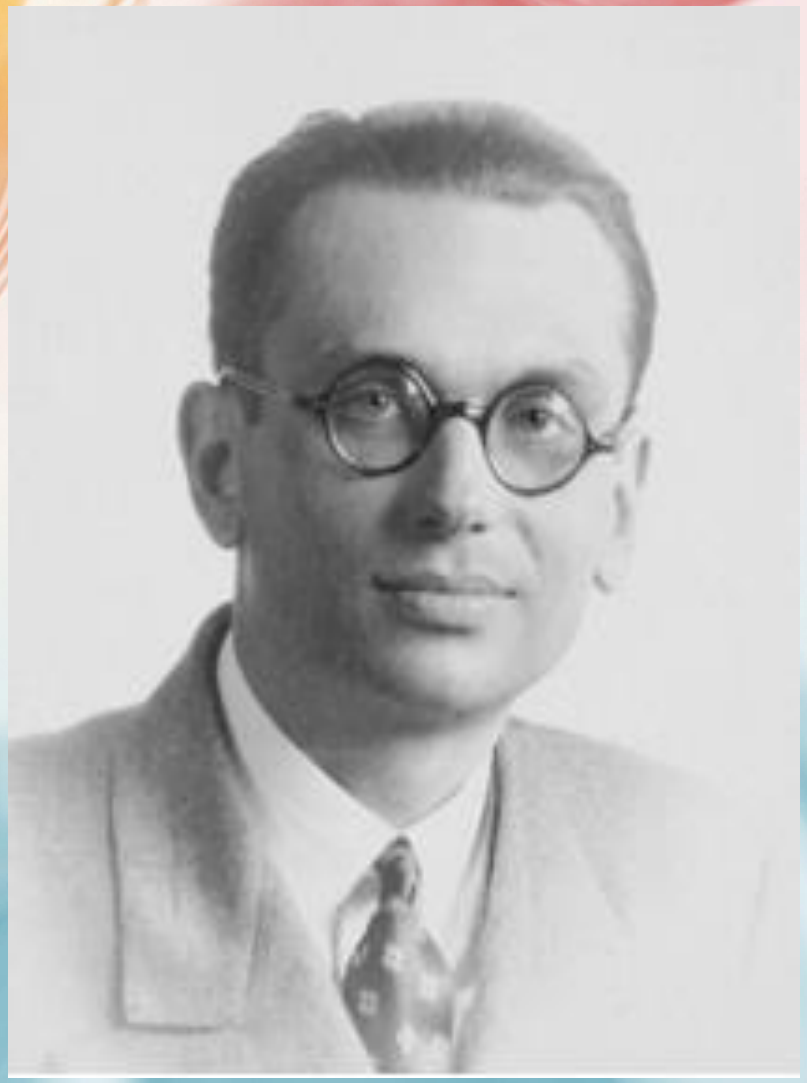
http://en.wikipedia.org/wiki/Maurice_Allais

Maurice Félix Charles Allais (born 31 May 1911) is a French economist, and was the 1988 winner of the Nobel Memorial Prize in Economics "for his pioneering contributions to the theory of markets and efficient utilization of resources."

Godel's Incompleteness Theorems

Godel's First Incompleteness Theorem:
Any adequate axiomatizable theory is incomplete. In particular the sentence "This sentence is not provable" is true but not provable in the theory.

Godel's Second Incompleteness Theorem:
In any consistent axiomatizable theory (axiomatizable means the axioms can be computably generated) which can encode sequences of numbers (and thus the syntactic notions of "formula", "sentence", "proof") the consistency of the system is not provable in the system.



Kurt Gödel

III.迷信的科学: 唯物论

- TCM is absurd: Qi controls body, yet Qi is unobservable; MWM is true: blood and vessel
- The observable/唯物 is scientific while the unobservable/唯心 is not. Yes, for natural systems.
- “实践是检验真理的唯一标准”？

III.迷信的科学: 唯物论

- *What are* 实践/*facts?*
- *Why is* 唯一标准?

III.迷信的科学: 唯物论

What are 实践/*facts*? 实践/*facts* may not been seen but exist

- TCM cannot live without 气/Qi
- Qi exists with live body; no with dead
- No detection of Qi cannot show non-existence
- 唯心: Qi Controls signal flow
- "唯心": Pure mind controls object. Brain-computer interfacing
- Software/hardware

III.迷信的科学: 唯物论

What are 实践/*facts*? your observations have Limited time and you cannot see the whole sample set,

- Bubble is true, fact, verify some theory. Take it or not;
- What if a bubble lasts long?
- Keynes theory, fiat money, lead to boom for hundred years? True?
- One collapse fails them?

III.迷信的科学: 唯物论

What are 实践/*facts*? your observations have Limited space you cannot see the whole sample set,

- Elephant
- Black swan

III.迷信的科学: 唯物论

What are 实践/*facts:* you only see a small subset but not whole set. **Your observed facts may not be a representation of reality. But you often take them as so, leading to mistakes**

- A mental experiment: draw coins.
- Variation 1: stock investment services
- Variation 2: financial services and advisers
- Nassim Nicholas Taleb: <<Fooled by Randomness>>

III.迷信的科学: 唯物论

- There is a large sample set, but noise is too big to draw meaningful conclusion. Assessing funds is difficult": Untangling skills and luck is hard if randomness is significant. Mutual fund study-Forbes magazine
- There is a large sample set, but they are taken from non-stationery process. Hedge fund study-Man Investment

III.迷信的科学: 唯物论

“实践是检验真理的唯一标准”？

- Mental experiment cannot prove anything?
- Logic reasoning cannot prove anything?
- **Danger: It can greatly limit our imagination and creativity**

III.迷信的科学: 唯一时间

- Time follows one way passage; not reversible
- Physical system: initial value problem, present > future, one way, path-independent, Markov process.

III.迷信的科学: 唯一时间

Past-present-future interplay

- The key difference between economics and the natural sciences is perhaps the fact that decisions of economic agents today depend upon their *expectations* or *beliefs* about the future.
- Natural system-weather: after a couple of weeks of bad weather before a major holiday season, people dream and hope for nice weather for coming holidays. The dream and hope will *not* affect the weather in holidays
- Social system-financial market. In contrast, the dreams and hopes of Dutch investors for excessive high returns on their investments in tulip bulbs in the seventeenth century may have contributed to or even caused what is nowadays known as the Dutch "tulip mania",
- Economic system is an *expectations feedback* system.
- Science can handle it? Not yet

III.迷信的科学: 唯一时间

Financial security valuation: 现值公式/Present value formula

future > present

$$P_o = D_1/(1+i)^1 + D_2/(1+i)^2 + \ldots + D_{inf}/(1+i)^{inf}$$

P_o	= present value of common stock (with constant growth returns)
D_o	= most recent per-share dividend
D_1	= per-share dividend after one period of growth [D1 = D0 (1+g)]
i	= required return (discount rate) for each year t
inf	= infinite time period

- 社会心理学中有一个“托马斯原理”：如果人们把情境界定为真实的，那么它们在结果上也就是真实的。“伯虑愁眠”的传说可以成为该原理的例证：话说海外有个伯虑国，那里的人们认为睡觉意味着死亡;于是他们视睡眠为畏途，想尽各种办法保持清醒。长期缺少睡眠的人自然是免疫力下降，极度虚弱。一旦有人实在熬不住昏睡过去便真的长眠不醒;这些死亡案例又反过来坐实了他们先前的担忧，整个伯虑国的人更加恐惧睡觉。故事本身并不足信，但现实生活中不乏类似的案例。比如上世纪三十年代大萧条时期的美国，有谣言传说某银行即将破产，于是人们前往挤兑，结果原本没有问题的银行就此倒闭，预言成真。社会学家默顿曾据此提出“自证预言效应”。凡此种种，都说明了一个道理：人们对事物的主观看法往往能决定其客观走向。

III.迷信的科学: 唯一空间

- Communication between different people or worlds needs media, or expression system, or a map from mind/feel to words/picture/sound
- 理性世界:
- Scientific definition, theorems, experiment are transparent, and learnable by IQ training. Lead to unified single world, a rational world.
- Rational world: expression is irrelevant unless wrong. Scientific statements carry no more information than its facts. You learn Newton's laws, not from his book, but from modern books. Same outcomes

III.迷信的科学: 唯一空间

- 感性世界: Arts are not. you cannot learn piano by just reading books. You must experience it to know it, while a pure mental thinking cannot know. An emotional world is different for people
- Sound HiFi system. Sound engineer
- Emotional world: expression is relevant, and carries useful information; Classic novels create emotional responses different for people. Expressions are not unique; Human individuals may have an multiple-value relation, failing almost all math.

- 认知空间/差异性

III.迷信的科学: 唯一空间

- Unable to express emotion accurately with words
- Approximations make difference
- <<周易>>如是说：“书不尽言，言不尽意。”
- Expression is doing undoable
- Thus, if you do not see or feel something, it does not mean it does not exist, someone in a different world may see or feel it realistically.

III.迷信的科学: 唯一时空

Human body and society are competitive systems: zero-sum game

- Physical systems: Newton's law holds for physical systems regardless of human recognition and usage
- Financial systems: stock markets. any good understanding and action of market will change/destroy market behavior. Any forecast theory or model is self-destructive once popular, market is a zero-sum game, unlike a drop of apple where Newton's law always holds anywhere and anytime in the earth, whether you use it or not
- life＝game; zero sum game
- Watch football: all stand to watch. No gain
- Medical: Kill virus or stay with them. Can one kill all virus forever? MWM/science bubbles and busts

III.迷信的科学: 唯一时空

Competitive system – mysterious cause-effect

- Humans have a deep-seated desire to find the cause for any effect. Science seeks clear cause>effect relation; but life?
- You have to make sense, sure; but stock market does not have to make sense, neither has it a justification for price change. >20% drop on 1987 black Monday; recent 1000 drop of DJIA. There can be no cause/effect. Stock market is endogenous. And Small cause>big effects and vice versa
- Economics effects stock market, yes; but stock market affects economics too, see economic leading indicators/2009 economy
- Stock market (total or aggregate) and agents (components) affect each other. Agents drive the market, the market drives agents again in feedback form
- Medical: 生理-心理, cells-body

III.迷信的科学: 唯科学

Neoclassic economy

- Assumption of rational economic man
- Utility function maximization for each man
- society of same informed men to seek maximization of their utilities
- Total＝sum of individuals

III.迷信的科学: 唯科学

What fails science?

- Human is not rigid body but has emotion. Human individual behavior is not rational, which has been proven by behavior finance.
- A society with complex internal interactions and feedback is not equal to algebraic sum of its all individuals. Reductionism doesn't work, unlike physical systems.
- human body is not algebraic sum of its all cells.
- Complex system > over-simplification > science. But far away from reality; Complex system > no much simplification > rough, empirical, heuristic= non-scientific. but close to reality

III.迷信的科学: 唯科学

- Model of market or human is not perfect, but never mind, since science is approximation to reality. Something like approximation is better than nothing
- Warning: may go opposite to reality
- Go beyond the truth: disaster

III.迷信的科学: 唯科学

- Application to stock market. Efficient Market Hypothesis, no bubbles.
- But bubbles occurred; **Asset Bubbles and the Implications for Central Bank Policy**; Remarks at The Economic Club of New York, New York City, April 7, 2010; By William C. Dudley, President and chief executive officer of the Federal Reserve Bank of New York

III.迷信的科学: 唯科学

- Long Term Capital Management fund, combination of top practitioners and academicians such as Drs. Merton and Scholes who are Nobel prize winners
- Roger Lowenstein, “When Genius Failed: The Rise and Fall of Long Term Capital Management”
- After losing money in the South Sea Company, the largest financial bubble of his time, Newton said, "I can calculate the movement of stars, but not the madness of men."

III.迷信的科学: 唯科学

- Mark Twain said: "It ain't what you don't know that gets you into trouble. It's what you know for sure that just ain't so."
- Bob Marley, "*Time alone, yes time will tell*

  You think you're in Heaven but you're really in hell"
- "Science is a long history of learning how not to fool ourselves."

III.迷信的科学: 唯科学

Nassim Nicholas Taleb: "fooled by randomness"

- "What has gone wrong with the development of economics as a science? Answer: There was a bunch of intelligent people who felt compelled to use mathematics just to tell themselves that they were rigorous in their thinking, that theirs was a science. Someone in a great rush decided to introduce mathematical modeling techniques (culprits. Leon Walras, Gerard Debreu, Paul Samuelson) without considering the fact that either the class of mathematics they were using was too restrictive for the class of problems they were dealing with, or that perhaps they should be aware that the precision of the language of mathematics could lead people to believe that they had solutions when in fact they had none (recall Popper and the costs of taking science too seriously). Indeed the mathematics they dealt with did not work in the real world, possibly because we needed richer classes of processes —— and they refused to accept the fact that no mathematics at all was probably better.

III.迷信的科学: 唯科学

- Buffett found it “extraordinary” that academics studied what was measurable, rather what is meaningful. **They try to fit the world to their model, but not to fit their model to the world”.**
- Academician are judged in terms of how their papers/methods/theories look intelligent, but not in terms of applicability in real world
- 何(理论物理)教授,“据我所知，现代药物学家，就很少愿意从事中药的提炼、疗效及其副作用的研究，原因是成分太多，太复杂，很难研究清楚，做出确切的结论,用我们的术语说，是很难做‘干净’的科学研究，当然也就很难做出成绩。”
- A man died of thinking instead of action

V. CONCLUSIONS: 唯物与唯心

Final remark: 圣严法师, <<圣严说禅>>, 风动，幡动，心动

问：六祖惠能大师从五祖弘忍门下得到传承之后，到了广州法性寺，见到两位和尚对著寺前的旗子在争论，一个和尚说：「你看旗子在动。」另一个说：「是风在动。」惠能说：「你们两个都错了，既不是风在动，也不是幡在动，是你们的心在动。」两个和尚被点破，非常拜服，而我们听故事的人似乎也心动了一下。请师父开示

答：这也是《六祖坛经》中的故事。当时惠能已经开悟，和一般人有不同的看法。一般人是从外境的现象著眼，透过主观形成因人而异的判断。外在的环境如果没有主观的人去观察它、体验它，它是毫无意义的。一旦通过人的观察、体验和认识，就失去了客观事实的标准。因为每个人内心的反应都会因时、因地、因他自己内心的情况而有所不同，所以两个和尚看到幡在动就会有两种不同的想法。这两种想法都是错的，最正确的答案是他们两人的心在动。

V. CONCLUSIONS: 唯物与唯心

从这个事实来看，人间所谓是非、好坏、优劣、善恶等等判断，并没有一定的客观标准，都是因时、因地、因主观想法而有所不同。所以叫作虚妄，不是真实，既非真实就不要执著。唯有对一切现象不起执著，才不会生起爱憎等等烦恼心，那就是自在的人。是不是可能做到幡不动、风不动、心也不动呢？其实没有必要。有风的话幡一定会动，只要自己的心不随著环境而乱动，不要被环境牵著鼻子走，不用主观的自我意识来观察、衡量、判断，这是比较妥当的，也比较不会产生矛盾和冲突。很多人只因多管闲事而烦恼不已，其实只要心不受环境所动，不离智能和慈悲两个标准，就不会有烦恼了。因此，我们普通人也可以练习不受威胁利诱，不为声色所动，这也就是人间的智者和勇者。

V. CONCLUSIONS: 唯物与唯心

- 科学解决物的问题有效,科学解决心的问题失效
- 科学的可以是错的，不科学的可以是对的。
- 完全从物理,科学的角度看人体、人的社会是行不通的
- 人非物，唯物论未必完全正确;
- 人有心，唯心论未必完全荒谬。

IV. CONCLUSIONS: 对立与统一

- Natural systems: science
- Social systems: non-science
- Human systems: half way > non-science based on deductive logic
- Science can co-exist with non-science. We need both

V. CONCLUSIONS: 对立与统一

- Math and science is powerful but its power is not infinity
- The world with science only is dry, boring, non-human. Non –science subjects are not no-sense.
- The root cause of difficulty of human body/society study is mind; But the mind is what distinguishes human from others
- Happiness is more mental status than physical status
- "The only certainty in investment is that there is no certainty. The only constant of the world is changing and uncertainty"
- "The most responsive to change will survive, but not the strongest, or most intelligent or smartest"
- Winston Churchill, "The empires of the future are the empires of the mind".


THANK YOU!