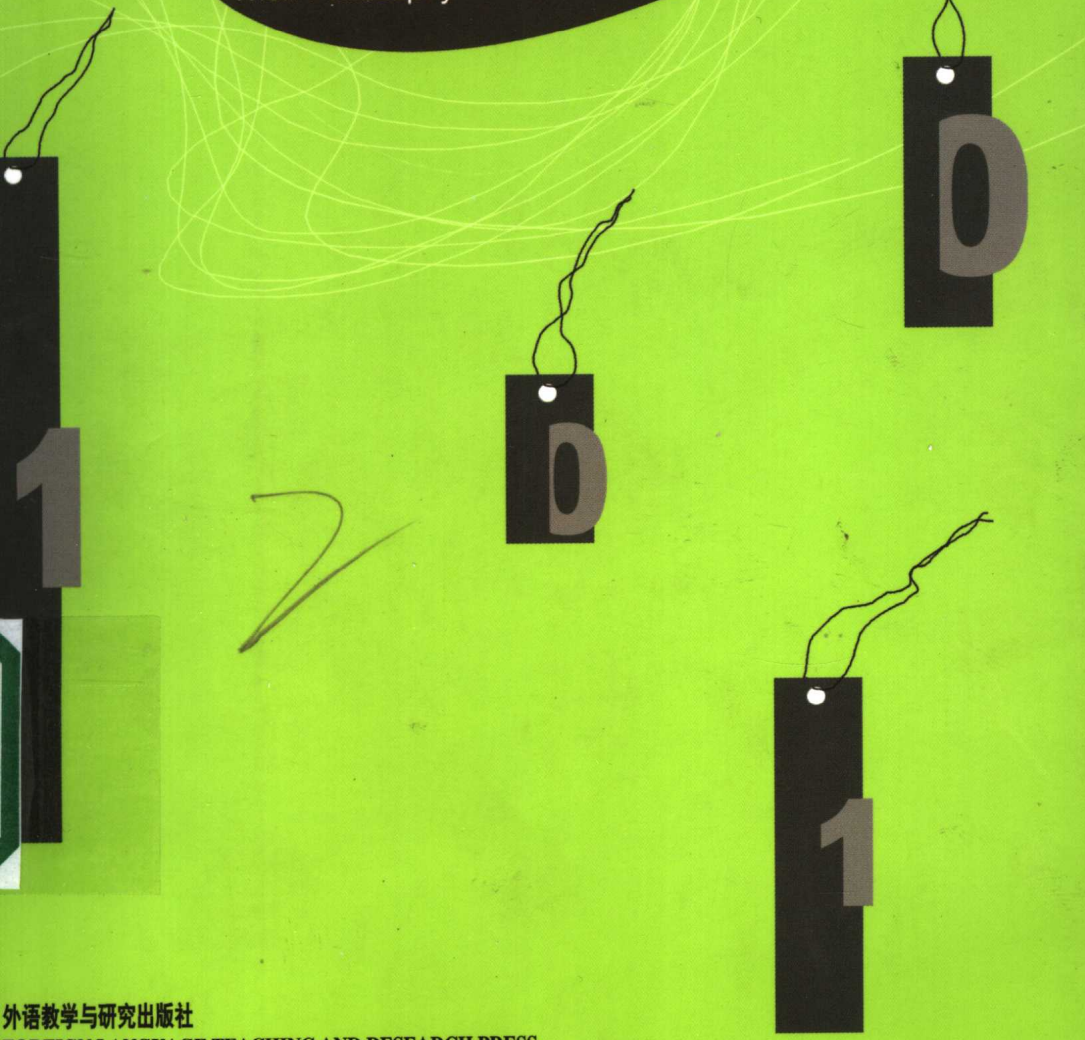
英汉双语

当代高科技及其哲理

林钜洸 著
林道棠 李家真 校订

Contemporary Hi-Tech & Science and Their Philosophy



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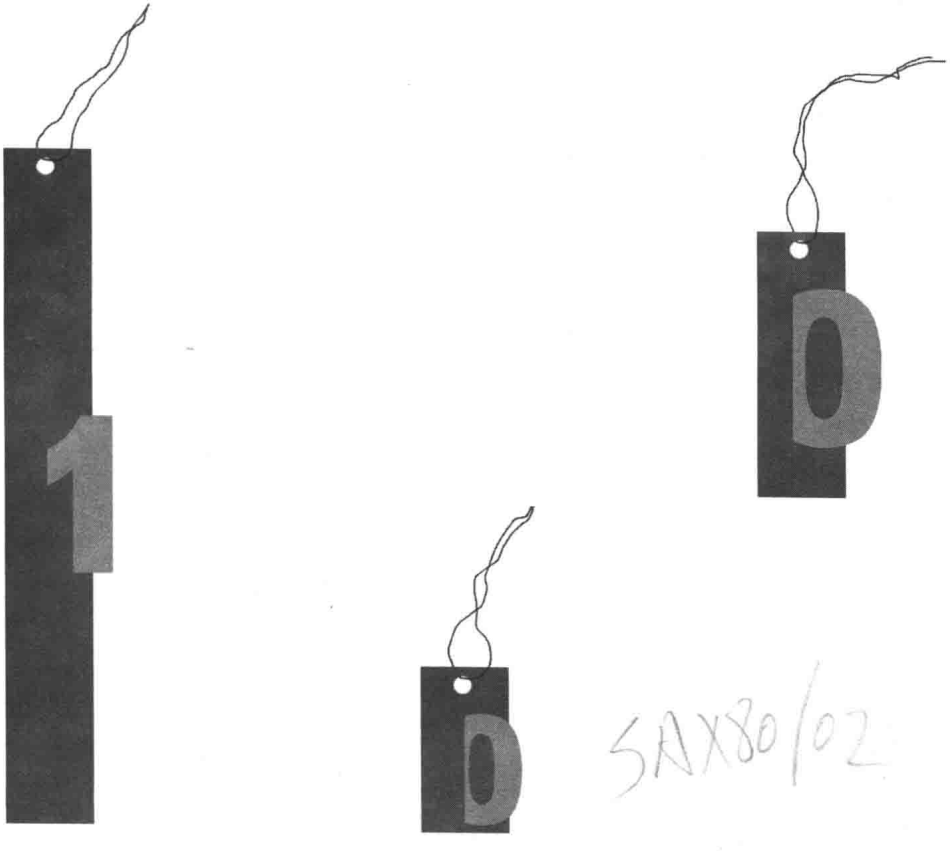

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(英汉双语)
林钜洸 **著**

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林鉅洗著譯 林道棠校訂

當代高科技及其哲理

二〇〇三年秋王雄儒書

序言

科学的目标是通过观察、推理及实验来认识自然，把认识概括成法则和定理，建立起一套系统性的学问。技术的目标是运用科学的法则定理，改善自然环境，提高人类生活水平。在不少情况下，科学和技术很难分开：例如，计算机开发、太空探索、生命研究等领域中都有科学和技术两个方面的内容。通常科学先走一步，有了成绩，技术很快就跟上去，付诸应用。

科技有五个特点：

(1) 可重复性，不是突然偶遇的叙述；

(2) 经济性，有应用价值；

(3) 可测量性，有实验证明，非天马行空；

(4) 启发性，一步一步靠逻辑推理引导出新的结论；

(5) 契合性，各门科技学问是一个整体，共同发展，并行不悖。

学习科技要发挥学者专家锲而不舍的研究精神：

(1) 尊重自然规律。宇宙运行规律是客观存在的，不以人的意志为转移。学习者尊重科学家摸索出来的结论，利用结论去推动、发展科技，达至新的境界。

(2) 抱有怀疑精神。人们对宇宙各方面的认识是一个逐步深入的过程，总不可能百分之百地正确。科学家的观察都有时空条件，理论随时空改变而有修正的必要。学习者遇上实验结果与科技理论相悖时，应深入研究理论是否有误。

(3) 态度客观冷静。欢迎别人提意见，进行深入辩论，接受辩证结果。批评别人要凭事实根据，提出自己认为正确的主张。

著译者曾著有《21世纪高科技中译英教材》，1999年初出版发行以来，一直在香港中文大学本科课程及香港大学专业进修学院课程中被作为基本教材讲授，受到学生、学者同仁的热烈欢迎。

世界已经进入信息时代，社会面貌一新。个人娱乐、家居生活、办公设备、商场交易、股票买卖、银行业务、公司运作、学校教学以至私人通讯都已数字化、计算机化、无纸化。我国提出科技兴国，进行西部大开发，建设水电站，大力发展工农业。科研工作大面积铺开，中国宇航员上了天，军舰、导弹等国防力量正大大增强。美国、日本、欧洲等地区和国家都在已有的高科技基础上，积极开发新项目。这是一个日新月异的时代，科技书籍、商品介绍、科学杂志，及至电视电影，不断大量地涌入亚洲市场。大报章也纷纷增发报导科技信息的副刊，可见今天的科技工作，时不我待。知识落后的人就要挨打、要失业、要被新时代淘汰。

新科技发展迅速，各学科互相渗透，科技人员除了精通本专业知识外，还必须有广阔的视野，掌握跨学科的知识，才能做到与时并进。有鉴于此，本书的宗旨在于：为那些有抱负、有专长的科技人员提供一些扩宽视野的高科技知识，使其能持续跟进世界高科技前沿发展的最新状况。

哲学主要用推理方法，而不用观察实验方法，去了解分析现实，创造概念，提高智慧。

本书介绍的高科技哲理，提纲挈领，共分十二个范畴。第一章至第四章引进科学新概念和理论，第五章至第十一章介绍高新技术成就，第十二章回顾宇宙形成的历史、预测未来社会的发展趋势，总结全书。本书涉猎广泛：包括宇宙超弦、大统一理论、多层次宇宙、天文历史年代学、基因研究、新进化论、电子味觉、卫星定位、量子理论、第四代移动电话、世界一体化、未来兵器、未来言语、10亿年后的太阳系以及21世纪有待解决的科学难题等，都是国内外读者感兴趣的题材。每章的开始，引用老子道德经名句及一些欧洲哲学观点。每章配有相关的插图，使读者对这些新知新趣有深刻的印象。

本书的另一特点是双语编写，读者可按兴趣参照中、英文阅读，学习翻译的人士也可对双语间的转换加深了解。

历史已经证明：昨天人们认为完美无缺的理论，即使是科学大师们创立的新说宏论，今天也可能被发现不够完善。例如，今天的学者已经发现牛顿的经典光学，玻尔的原子模型以及爱因斯坦的光速极限只能适用于特定的、有限的范围，所以应该用怀疑的观点看待经典理论。也就是说：权威著述也有不完备之处。科学家用简单的理论概括极其复杂的现实，以其有限的视野、短暂的一生、主观的头脑来认识世界，怎么可能百分之百地完善呢？

今天人们已经认识到，科技、文学、哲学来自同一个世界，它们之间确实存在密不可分的联系。本书运用了不少篇幅描述文、理、哲之间的跨学科思维方法，希望帮助读者把握契机，开阔思路，主动自我增值，这不仅有助于个人的提高、同时也有利于个人对社会做出更大的贡献。

在当今日新月异的时代，作者自知绵力浅薄，以其有限的知识、观察、理解与表达，难免挂一漏万，所以热诚地希望读者指正，以便改进。

著译者

二零零四年十月

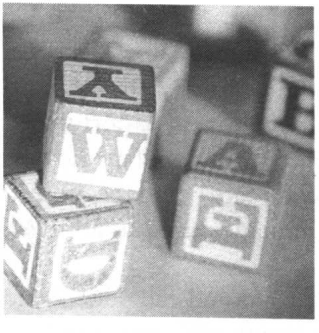
说明：本书以中英文分别写就，以对照方式排版，只为行文方便及说明事理，书中中英文字句并非精确对应翻译，请读者留意。

目 录 CONTENTS

SCIENCE, TECHNOLOGY AND THE ARTS
科技与人文

Matters surrounding us are markedly different. Differences make contradictions that create opposites. Arts and science, English and Chinese, the civilized and the backward, the learned and the illiterates, form several natural pairs of opposites. The two opposite sides, however, do not have any clear-cut distinction. On the contrary, the two sides may overlap in some areas and may transform into the opposite. Thus learning may help illiterates to become knowledgeable. Also, translation turns English into Chinese or any other texts.

天下事物千差万别，差别形成矛盾，矛盾产生对立面。人文与科技、英语和汉语、文明与落后、有识与无知，都是矛盾的对立面。对立的双方没有截然的分界。相反，它们可能还有相同的一面，可以互相转化。例如学习可以使无知变成有识，翻译可以把英语转为汉语。



Language and Technology

Humans, in their early tribal society, cherished the desire to lead a comfortable life. This desire was substantiated in two objectives: first, the desire of having more food and other daily necessities; second, the desire to obtain products quicker and with less labor. In achieving the first objective, they chose a tribal leader to organize individual farming and largescale hunting. Group activities in turn necessitated verbal communications, so a tribal language was formed. In achieving the second objective, tools were made, animal power and fire harnessed while natural materials and fuels were used to upgrade the productive efficiency, thus bringing about technical inventions.

The invention of the wheel was a remarkable technical achievement, facilitating frequent intercourse and commodity exchange among the tribes. Consequently, the tribes gradually grew into townships, cities, states, and countries. Tribal language were respectively developed in small areas, having strong local characteristics. Languages in different areas had to go through a period of merging wherein common expressions, understandable and acceptable to both partners in communication, had to be identified and created to achieve interchange of conceptions among different cultures. The profession of translation thus took shape under the impetus of commercial needs and the growth of technical capability.

Rapid development of transportation successfully broke through language barriers, leading the whole world to globalization. Scientific and technical (S&T) research has become much harder today, which requires further global cooperation and specialist interventions. Research tasks would be impossible without further contributions by linguistic workers and translators.

What is the common language of S&T? Since World War II, the US and UK have led the way in S&T, it is quite natural that English should become its language. However, German and Japan have also performed remarkably in the technical field. The study of Chinese traditional medicines, acupuncture, and Qigong (a kind of exercise for health) are being recognized and applied in medical treatment worldwide. Languages used in all these countries are useful.

When you are knowledgeable in Mandarin Chinese and can understand English literature, does it mean that you have mastered the principal working languages of S&T? Perhaps non-professionals are still unaware that the

科技和语言

早在部落社会时，人类就希望生活得舒服一些。这种愿望具体表现为两个方面：第一，希望有更多的食物和生活必需品。第二，希望少劳多得。要达到第一个目的，必需有个部落首领，组织众人，分工合作，耕种捕猎。人际合作需要用声音沟通，于是产生了部落语言。而要达到第二个目的，便要创造工具，利用兽力、火力，使用天然的材料、燃料，提高生产效率。于是出现了技术发明。

运输工具是一项了不起的技术发明，便于部落之间频繁往来，发展贸易，互通有无。部落逐渐扩大为城乡邦国。部落语言本来在较小地区形成，带有强烈的地方色彩，不同城乡邦国的不同语言要经过一段磨合，找到为大家普遍理解和接受的通用表达方式后，才能使不同的文化概念实现交流。于是商业交往，技术进步，促成翻译这一职业。

运输工具的迅速发展成功地打破了语言障碍，导致世界一体化。今天的科技发展，难度更高，需要世界各国、各专业分工合作，更离不开语言的推动、翻译的帮助。

什么是科技的通用语言呢？二次世界大战以来，英美两国的科技领先于世界，人们很容易联想到英语是天然的科技通用语言。其实，德国、日本的科技成就也很高。中医、中药、气功，已在世界范围内得到公认并应用于临床。这些国家的语言也相当重要。

会讲汉语普通话，看得懂英文书籍，是不是就掌握了科技工作的主要语言呢？外行人可能不知道：科技人员平时表达沟通所用的主要语言，包含了数学、化学、物理，甚至哲学、专业术语

principal language for communication among S&T workers involves mathematics, chemistry, physics, philosophy, professional and trade jargons, and descriptive geometry (drawings). Some conceptions or ideas, that cannot distinctly be expounded with lengthy descriptive sentence could easily be expressed comprehensively and briefly by means of formulae and graphs. Learning science and technology may be like learning a new language for some students.

The Science of the Arts

Einstein is famous for his formula $E = mc^2$, which shows that mass and energy are interchangeable. That is to say, all matters (m) may be regarded as energy (E) activities. Thoughts and culture are products of energy waves in the human brain. All we possess in this world, including writings, talent, money, the beauty, reputation, authority, and life, are, in the final analysis, an embodiment of energy potentials at a certain coordinate in the time-space continuum.

Then, what actually represents the substance of information, idea, literature, and language? We now know that literature and ideas are represented by words, sentences or human language in generel. Words consist of letters. Letters may be stored on diskettes in [0,1] codes, which can be transmitted in [0,1] electric pulses. Hence the ultimate representation of information is signs or signals formed by a bunch of [0,1] energy potential collection in a coordinate in the time-space continuum. Quoting *Laozi's* concept of [being, nothingness], or [1,0], of 2,500 years ago, matters and ideas are no more than a dynamic [0,1] picture of energy potentials in this time-space continuum.

The Arts in S&T — Translation

The translation theorist *Peter Newmark* of the UK says, "Translation is a craft consisting in the attempt to replace a written message and/or statement in one language by the same message and/or statement in another language." This statement can be somewhat extended as follows:

Broad Sense Translation. "Replace the same message in another language"

乃至投影几何（绘图）——有些冗长文句说不清楚的内容，用数学公式和图形就可以全面准确、简明扼要地表达出来。所以对某些学生来说，学习科技有点类似学外语。

表达文学艺术的科学

爱因斯坦著名的$E=mc^2$公式揭示出能量（E）和质量（m）的等值关系。这样，世界的一切事物都可以看成是能量的活动。思想、文化是大脑能量活动的产物。我们拥有的一切东西，包括著作作品、天才、金钱、美貌、名誉、权位、生命，究其根本都是宇宙时空中一些能量活动的点集，或者说，是宇宙能位的聚点。

那么，信息、思想和文学的本质是以什么为代表的呢？文学和思想无非是能够以一串“字母”表达的词句及其形成的语言来表达的符号，而字母是可以用[0,1]编码贮存在计算机中，又可以用[0,1]脉冲传送的信息。因此，信息的终极是时、空坐标中一团可以由[0,1]表达的能位。借用2500年前老子的[有、无]（即[0,1]）概念，宇宙的物质、思想无非是[0,1]能位在时空系统中，有无共生的动态图帧。

科学技术的表达手段——翻译

英国翻译理论家彼得·纽马克指出：“翻译是一种技巧，把一种语言的信息或陈述，用另一种语言的相同讯息或陈述来代替。”这句话可以略为引申如下：

广义的翻译

“把相同的信息用不同的语言陈述”，就是指用不同的交流方式去表达，譬如数学上有简化、变换，物理、化学有定理、公式，

means to express the same information using different communication methods, such as simplification and transformation in mathematics, theorem and formula in physics and chemistry, painting and sculpture in fine art, and abstract and romance in literature. A novel can be recompiled into a poem, a ballet, a movie or a drama, a painting or a symphony. Though the substance remains the same, the language or means of expression could be diversified.

Under specific conditions, there may be mono-translations, for instance, of Chinese language such as Cantonese dialect or Regular characters into Putonghua or Simplified characters, or of English language such as deciphering of coded information. Therefore, various mono-dictionaries are compiled and marketed.

Specific Sense Translation. This is what we take as translation. This book provides bilingual texts of S&T materials of Mandarin Chinese and of contemporary English.

The Views on Natural Surroundings

The view on natural surroundings has consistently changed the ways of S&T research.

Isolated Entity. Since the 16th century, scientists have applied the method of observation to classify, file, describe and analyze phenomena, stimulating creations and inventions. To simplify the research process, they isolate the individual object from its surroundings, and describe its performance in the time and space domain with linear continuous-variable equations, arriving at a deterministic analysis, such as Newton's Second Law of Motion and the Equation of Moving Body. These solutions form the contents in today's high school textbooks.

Closed System. At the dawn of the 20th century, a series of new views have been established:

(1) Everything is changing all the time, maybe from quantity to quality change, maybe one thing can be divided into two or two can be combined into one;

(2) All objects interact to a certain degree with, and not isolated from, one another;

美术上有图画、雕塑，文学上有摘要、演义。一部小说可改编为诗歌、芭蕾舞剧、电影、戏剧、油画或交响乐。内容虽然相同，表达的语言或方式却可以变化转换。

在特殊情况下，可以有同语种的翻译，例如中（粤语、古文、繁体字）译中（汉语普通话、白话文、简体字）和英译英（破译密码）。这就是同语种、同义词词典存在的原因。

狭义的翻译

这是通常人们所谓的翻译。本书采用了中英文双语。中文是指汉语普通话，英文指现代美式英语 （见附录 F.1）。

科学的世界观

新世界观不断改变科技研究的方法。

孤立实体

16世纪以来，科学家用观察方法，将各种现象加以分类、归档、描述和分析，以激发创造发明。为了简化研究工作，先把研究对象孤立起来，使之从其所处环境中分离出来，再把它的性能用线性连续数学公式在其所处时空领域中进行描述，得到确定性的分析，例如牛顿的力学定律、运动方程式等。这些内容就成为了今天中学教科书的内容。

封闭系统

20 世纪初，一系列新观点相继形成：

(1) 每件事物都在不断变动；可能是量变到质变，可能是一分为二，或合二为一；

(2) 所有事物在一定程度上都是互相影响的，而非孤立的；

(3) All objects are alike in some respects and differ in some other respects; different parts inside the object are not completely alike;
(4) Difference is contradiction, which may reach unity and produce new contradiction;
(5) Space and time are discrete, and numerous gaps may exist with different functions;
(6) Instrumental measurements can never reach absolute accuracy and certainty.

Quantum Theory and three earlier theories, *Information Theory, Cybernetics, and System Theory* evolved. A group of objects can be treated as a system. Analysis is carried out in linear *frequency domain*, instead of non-linear time domain. *Complex function* mathematics like Laplace, Fourier or *Z-Transform* has been widely used. Statistical methods and fuzzy logic have been developed and applied. Solutions are *probabilistic.*

Open System. To describe how a system is influenced by its surroundings, three modern theories were established around 1980, namely, the *Theory of Dissipative Structure, the Theory of Synergetics*, and *Catastrophic Theory.* The world is viewed as being composed of constantly self-changing systems from orderly to chaotic, and under some conditions, from chaotic to orderly. The *Theory of Evolution* can now be described as a *self-organizing development* system urged by the environment. The *Theory of Chaos* presents an explanation of the conditions governing the changing between order and chaos. Non-linear and *discrete approaches* are favored due to the available programming function of digital computers.

Characteristics of S&T Expression

S&T English differs very little from literary English. The techniques and grammar set down in various literary texts are generally applicable here.

Present Tense. S&T statements are mostly always true. Present tense is often used.

E.g. *Translation **is** a craft.*

Objective Description. S&T literatures largely describe natural phenomena. An objective entity rather than I, We, Everybody is used as the subject of a

(3) 物和物之间有某些相似之处，又存在某些差别；某一物体内的各部分也并非完全一样的；
(4) 差别就是矛盾，矛盾可能达到统一，然后又产生新的矛盾；
(5) 时空是离散的，其间有很多空隙，但空隙另有其作用；
(6) 仪器的测量难以达到绝对精准。

由这些新的观念中产生出了量子力学和老三论：即信息论、控制论和系统论。一组相关联的物体，可以作为一个系统去研究。分析可以不在非线性的时间域而是在线性的频率域中进行，拉普拉斯变换、傅立叶变换及Z变换等复变函数工具得到普遍应用。同时，数学统计方法和模糊逻辑也得到了发展和应用，其解答是概率性的。

开放系统

为了研究周围环境对系统的影响，20世纪80年代出现了科学新三论：耗散结构论、协同论和突变论。世界被看作是由许多不断自我改变的系统构成的，从有序变为无序，又在某些条件下，从无序变为有序。进化论就可以说是一种受外界推动的自组织演变。混沌论探讨无序有序的变化规律。非线性和离散方法因数字计算机的编程功能而饱受青睐。

科技文章的表述特点

科技英语和文学英语差别其实并不大。读者从各种不同的文学读本中学到的文法和翻译技巧一般都可以在科技表达中使用。

现在时态

科技讲的绝大部分是真理，习惯上用现在时态陈述。
例如：*Translation is a craft.* （*翻译是一种技巧*。）

客观性的描述

科技文章大多描述客观自然现象。一般不用我、大家、你们、每人等词，而用事物作主语。也不加褒贬。

statement. Praising and pejorative words are seldom used.

E.g. ***Amount of information*** *cumulates exponentially over time.*

Passive Statements. For similar reasons passive voice is often used. The statement will become active when the subject is changed.

E.g. *To be a good translator, both speed and quality are required in applied translation.*

Speed and quality of translation are both vital for survival as an applied translator.

The first sentence is in passive voice while the second is in active voice.

Terminology. The use of standardized terminology can clearly define and simplify a statement. For example "Jeans" has been coined in English, then a standardized Chinese translation *牛仔布*、*牛仔裤* is given as equivalent. Quite a number of new terms have yet to be standardized. For instance, varnish is named *清漆* in formal Chinese, and it is called *凡立水* in the trade. Of course standardized terminology should be used whenever possible, however, it is not a must, and the terminology should be chosen to accommodate the stratum of the target readers when necessary.

To accommodate expression in trade language, a wide knowledge of professional terminology is required. Otherwise the translator will have to consult a large number of specialized dictionaries, which is time-consuming. For instance a number of names of Dinosaurs such as Tyrannosaurus Rex could not be found in ordinary English dictionary.

***Order* of Words and Clauses**. This may be different between Chinese and English. The former prefers statements given in a *logical order or time sequence*, whereas the latter prefers major events to be put in the main clause, which usually comes before the subordinate clauses. For example, in Chinese order "*because X, therefore Y*"; "*If W, then Z*". In English, the order can be changed to "*Y because X" and "Z if W*".

Analysis is carried out in the linear frequency domain, instead of non-linear time domain. In Chinese presentation, the subordinate clause usually goes first.

***Long and Short* Sentences**. S&T translation prefers semantic accuracy and clarity to literary beauty. Long sentences may be broken down into shorter ones as long as the correct message is passed on. The same is true for short sentences to be combined into long ones.