英语

科普阅读

郭继荣　赵冬梅　史　焱　编

2

西安交通大学出版社

英语科普阅读

2

郭继荣　赵冬梅　史　焱　编

西安交通大学出版社
·西安·

内容简介

本书为系列英语科普阅读的第二册。全书共收集文章70篇，题材广泛，涉及时事政治、科学技术、经济文化、名人趣事、著名机构介绍及诸多热门话题；题材新颖，融趣味性，知识性与可读性于一体；体裁多样，涵盖了记叙文、说明文和议论文等。每篇文章均附有内容提示、词汇注释及长句、难句翻译、分析等，以提高读者阅读效果和理解水平。

本书可作为大学英语四级水平读者及其他同等水平的英语爱好者的阅读教材。

图书在版编目(CIP)数据

英语科普阅读．第2册/郭继荣等编．—西安：西安交通大学出版社，2000.8

ISBN 7-5605-1280-1

Ⅰ.英…　Ⅱ.郭…　Ⅲ.英语-语言读物，科学知识
Ⅳ.H319.4：N49

中国版本图书馆CIP数据核字(2000)第67664号

*

西安交通大学出版社出版发行
(西安市咸宁西路28号　邮政编码：710049　电话：(029)2668316)
兰田立新印刷厂印装
各地新华书店经销

*

开本：850mm×1168mm　1/32　印张：11.625　字数：290千字
2000年8月第1版　2000年8月第1次印刷
印数：0 001～5 000　定价：16.00元

《英语科普阅读》丛书

编委会

前　言

顾名思义,《英语科普阅读》是汇集科普类题材的系列读本。编写本系列书的目的是通过精心编排的系列阅读材料,帮助读者熟悉科普文章的文体特点、科技英语常用表达法并掌握科技英语常用词汇和专业术语。同时帮助读者掌握正确的阅读方法和技巧,从而为能顺利阅读有关专业原版教科书、参考书及其他参考资料打下良好的基础。

本系列丛书由三册组成。词汇量依次为 4 200,5 000 和 6 000。第一册共有 80 篇文章,为初级读本。内容涉及科学技术领域中的基本概念和常规性知识及其某些技术的应用。第二册共有 70 篇文章,为中级读本。内容涉及科学技术在生活各领域中的运用及一些前沿科技成果的介绍。第三册共有 55 篇文章,为高级读本,内容涉及最新科技成果介绍及对未来科技发展的展望。这三本书可分别供学习大学英语四级、六级的学生以及非英语专业硕士生使用。

本系列书力求做到寓知识性、趣味性和思想性于阅读实践中。全书内容广博,题材广泛,涉及专业面宽,有利于激发读者的学习兴趣,拓宽知识面和开阔视野。书中所用材料经过反复筛选,择优采用。为了保证语言规范,文章均选自英美等国近年出版的书籍和刊物,以反映现代科学技术的最新成果和发展趋势。同时,文章在词汇、拼写和用法等方面保留了英国英语和美国英语的特点,使读者有更多的机会接触英语的这两种主要变体。文章编排力求做到从易到难,由浅入深和循序渐进。每篇文章都配有内容提示和

难点注释,以帮助读者拓宽思路,加深对文章的理解,领会作者的观点和态度以及就文章的内容进行预测、分析、推理、判断和综合概括。应该说明的是:某些热门话题(如计算机、网络等)可能在三册书中重复出现,但文章难度不一,内容各异。

阅读理解是中国学生学习外语必须掌握的一项重要技能。因此,读者应通过大量阅读实践,善于把握文章的大意、发现和利用文章的冗余信息(指作者传递信息时重复的旧信息)、掌握必要的英美文化背景知识和熟悉英美人独特的表达方式和惯用法等。本系列书对读者提高这方面的能力定有裨益。

由于编者水平有限,错误和疏漏之处在所难免,热诚欢迎读者批评指正。

编　者

2000年6月

Contents

1. What's a Scientific Theory?

(什么是科学理论?)

内容提示:

史蒂芬·霍金是当今世界上继爱因斯坦之后最杰出的理论物理学家。在本文中,作者认为,理论不过是关于宇宙的模式或它的某一有限部分的模式,以及一整套把这个模式中的量与我们的观测结果联系起来的规则。能满足两个条件的理论就是好理论:首先它必须在只含有几个武断因素的模式的基础上对大部分观测进行精确的描述,再就是它必须对未来的观测结果作出明确的预言。

In order to talk about the nature of the universe and to discuss questions such as whether it has a beginning or an end, you have to be clear about what a scientific theory is. I shall take the simple-minded view that a theory is just a model of the universe, or a restricted part of it, and a set of rules that relate quantities in the model to observations that we make. It exists only in our minds and does not have any other reality (whatever that might mean). A theory is a good theory if it satisfies two requirements: It must accurately describe a large class of observations on the basis of a model that contains only a few *arbitrary elements*[1], and it must make definite predictions about the results of future observations. For example, Aristotle's theory that everything was made out of four elements, earth, air, fire, and water, was simple enough to qualify, but it did not make any definite predictions. On the other hand, Newton's theory of gravity was based on an even simpler model, in which bodies attracted each other with a force that was proportional to a quantity called their mass and *inversely proportional to*[2] *the square of the distance*[3] between them. Yet it prediets the motions of the sun, the moon, and the planets to a high degree of accuracy.

Any *physical theory*[4] is always *provisional*[5], in the sense that it is only a hypothesis: you can never prove it. No matter how many times the results of experiments agree with some theory, you can never be sure that the next time the result will not contradict the theory. On the other hand, you can disprove a theory by finding even a single observation that disagrees with the predictions of the theory. As philosopher of science Karl Popper has emphasized, a good theory is characterized by the fact that it makes a number of predictions that could in principle be disproved or falsified by observation. Each time new experiments are observed to agree with the predictions the theory survives, and our confidence in it is increased; but if ever a new observation is found to disagree, we have to abandon or modify the theory. At least that is what is supposed to happen, but you can always question the competence of the person who carried out the observation.

In practice, what often happens is that a new theory is devised that is really an extension of the previous theory. For example, very accurate observations of the planet Mercury revealed a small difference between its motion and the predictions of Newton's theory of gravity. Einstein's *general theory of relativity*[6] predicted a slightly different motion from Newton's theory. The fact that Einstein's predictions matched what was seen, while Newton's did not, was one of the *crucial confirmations*[7] of the new theory. However, we still use Newton's theory for all practical purposes because the difference between its predictions and those of general relativity is very small in the situations that we normally deal with. (Newton's theory also has the great advantage that it is much simpler to work with than Einstein's!)

The eventual goal of science is to provide a single theory that describes the whole universe. However, the approach most scientists actually follow is to separate the problem into two parts. First, there are the laws that tell us how the universe changes with time. (If we know what the universe is like at any one time, these physical laws tell us how it will look at any later time.) Second, there is the question of the initial state of the universe. Some people feel that science should be concerned with only the first part; they regard the question of the initial situation as a matter for *metaphysics*[8] or religion. They would say that God, being *omnipotent*[9], could have started the universe off any way he wanted. That may be so, but in that case he also could have made it develop in a completely arbitrary way. Yet it appears that he chose to make it evolve in a very regular way according to certain laws. It therefore seems equally reasonable to suppose that there are also laws governing the initial state.

It turns out to be very difficult to devise a theory to describe the universe *all in one go*[10]. Instead, we break the problem up into bits and invent a number of partial theories. Each of these partial theories describes and predicts a certain limited class of observations, neglecting the effects of other quantities, or representing them by simple sets of numbers. It may be that this approach is completely wrong. If everything in the universe depends on everything else in a fundamental way, it might be impossible to get close to a full solution by investigating parts of the problem in isolation.

Nevertheless. it is certainly the way that we have made progress in the past. The classic example again is the Newtonian theory of gravity, which tells us that the gravitational force between two bodies depends only on one number associated with each body, its mass, but is otherwise independent of what the bodies are made of. Thus one does not need to have a theory of the structure and constitution of the sun and the planets in order to calculate their orbits.

Today scientists describe the universe in terms of two basic partial theories — the general theory of relativity and *quantum mechanics*[11]. They are the great intellectual achievements of the first half of this century. The general theory of relativity describes the force of gravity and the large-scale structure of the universe, that is, the structure on scales from only a few miles to as large as a million million million million (1 with twenty-four zeros after it) miles, the size of the observable universe. Quantum mechanics, on the other hand, deals with phenomena on extremely small scales, such as a millionth of an inch. Unfortunately, however, these two theories are known to be inconsistent with each other — they cannot both be correct. One of the major endeavors in physics today, is the search for a new theory that will incorporate them both — *a quantum theory of gravity*[12]. We do not yet have such a theory, and we may still be a long way from having one, but we do already know many of the properties that it must have.

注释:

1. arbitrary element 武断因素
2. be inversely proportional to 与……成反比
3. the square of the distance 距离的平方

4. physical theory 自然科学中的非生物科学
5. provisional 暂时的
6. general theory of relativity 广义相对论
7. crucial confirmation 关键的证据
8. metaphysics 玄学;形而上学
9. omnipotent 万能的
10. all in one go 一步登天
11. quantum mechanics 量子力学
12. a quantum theory of gravity 量子引力论