

(上册)

科技英语教程

A COURSE FOR SCIENCE ENGLISH

靳梅琳 主编



机械工业出版社

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本书是为高等学校学生编写的科技英语教材。难度适中,既有科普知识,也有前沿科技内容,英语专业学生与非英语专业学生均可使用。本书选材求新求实,内涵丰富,所收入的文章都是反映欧美等国有关科技发展、科技动态、科技报道、科技探索等方面的内容,全部是原文,均选自 90 年代国外现行书刊。语言和内容富有时代气息,可以帮助大学生在提高科技英语阅读能力的同时又学到科技知识。

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《科技英语教程》上册

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前 言

《科技英语教程》是根据高校英语专业教学大纲的要求编写的,可供高校英语专业三、四年级学生,理工院校公共英语课的六级学生及广大自学者使用。

本书科技内容和专业题目覆盖面广,其中包括:通信卫星、太阳能、生态环境、医药、化工、计算机、气象、交通工具、合成材料、生物工程等。在科技飞速发展的今天,要求我们每个人都应该具有科技头脑,至少要尽可能多地掌握一些科技知识。随着改革开放的不断深化,我国科学技术有了长足的发展,对英语人才的需求也提出了更高的标准,他们不仅应该精通英语,还要通过英语掌握较多的科技知识。这是社会的要求,时代的要求,也是我国国情的要求。

本书内容求新求实,富有时代气息,所选材料都是 20 世纪末的优秀科技文章。编者从近年美、英、加等国出版的书中选取科技时文、科技报道、科普知识及科技人物评述等,题材广泛,具有科学性、可读性和趣味性。

本教程共分两册,本书为上册,共 30 课。每课中包括课文、生词、课文注释与练习。练习题形式多样,有填空、多项选择、判断正误、造句、句法分析、词汇对应、术语翻译、阅读理解等。阅读理解实际上是一篇课外阅读材料,也是有关科技内容的,它对于学生增长科技知识、拓宽科技视野、把握科技英语特点均大有裨益。

由于时间仓促,编者水平所限,本教程中不妥之处在所难免,请同行与广大读者斧正。

编 者

于天津理工学院外语系

1999 年 4 月 16 日

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Lesson One

Sound and the Effects of Noise on People

Sound is produced by the vibration of some object, such as the vocal cords, or the tiny diaphragm inside a telephone receiver. The vibrating material alternately pushes against the adjacent air, compressing it, and then retreats allowing it to expand. This phenomenon, propagated through the air, is called a sound wave. If it reaches a suitable surface, like an eardrum, it can set that vibrating.

A sound wave is characterized by its particular frequency, which is the number of times per second that the air is compressed and expands. The frequency of compression determines the pitch; the greater the frequency, the higher the pitch. If the frequency is between 20 and 20 000 Hertz, a normal young ear will hear it. The range of frequencies audible to other species can vary.

A sound wave also has its own peculiar strength or intensity, a characteristic which is related to loudness. There is a tremendous range, between the softest sound to which the human ear responds, such as the whisper of a leaf, and the loudest sound to which it has been exposed, probably the liftoff of a rocket. In order to reduce this large range to a more manageable size, a logarithmic scale is used. Each unit on the scale is called a bel, which is further divided into 10 smaller parts called

decibels.

Most sounds have a number of different frequency components. Each component can have its own decibel level. Sound meters equipped with filters can focus on the individual frequency components, or, more usually, on small groups of frequencies, and measure their decibel level. A graph of the frequency groups or bands in sound versus their decibel levels is like the fingerprint of a sound-a unique picture of the sound, called its spectrum.

A final parameter necessary to describe a sound is its variation in time. Sounds are either steady state-that is, continuous, like a siren-or impulsive, like a gunshot. Steady state sounds can fluctuate in intensity. All of these characteristics influence how a sound affects us, whether it is acceptable or whether is a nuisance.

Research has shown that noise affects people in several different ways. Hearing damage is the most well-known effect. Hearing damage involves some injury to the receptor cells, or the structure containing them, in the inner ear. The eardrum and middle ear are very rarely damaged by noise. Only an extremely loud sound pressure could burst the eardrum. Noise can also have more subtle effects. It may influence task performance, deteriorate one's mental or physical state, interfere with sleep, and increase the rate of accidents.

It is estimated that 6 to 16 million workers in such occupations as construction, heavy industry, flying, printing, mechanized farming and truck driving are exposed regularly to hazardous noise levels. In addition, some recent studies contain disturbing evidence of hearing loss among non-occupationally exposed young people. It is suspected that listening to amplified

rock-and-roll music may be causing hearing loss among young people on an epidemic scale. At one subcommittee hearing it was averred that certain rock groups contract that they will produce 120 decibels or forfeit payment.

Frequent exposure to noises of 80 db(A) or above and even exposure of a sufficient duration to sounds in the 70 to 80 db(A) range probably lead to diminished hearing ability. It has been suggested that noises in the range of 70 db(A) or greater should be reduced or avoided to prevent gradual hearing loss with age.

Noise causes three types of physiological responses. First, there is a voluntary muscle response in which the head and eyes turn to the noise source and the body prepares for action. This is exemplified by a startled response to a sudden loud noise.

Second, the involuntary muscles respond to noises over 70 decibels by general reduction in blood flow to the peripheral body parts (fingers, toes, ears) and changes in such functions as heart rate and breathing.

Third, loud noises can cause the responses which, from animal experiments, appear to affect sexual and reproductive functions and which cause overgrowth of the adrenal glands, among other effects. These results of course cannot be directly extrapolated to humans. Nonetheless, workers exposed to high noise levels exhibit an increased incidence of cardiovascular disease, ear, nose and throat problems, and equilibrium disorders. For instance, steelworkers have been shown to have a higher than normal incidence of abnormal heart rhythms.

Adverse psychological responses to noise have been noted in several areas. Task performance is affected by noise that is intermittent, although steady state noise even up to 90 db(A) does not seem to have much effect. Complex tasks are affected more

than simple ones, and accuracy is reduced more than quantity. Even when good performance is maintained, excess noise is fatiguing. People working in noisy environments are much less tolerant of noise in their non-occupational environment than those working in quiet surroundings. Time judgement is another response upset by noise. Certain types of noise can of course be helpful, such as rhythmic noises or those which mask distracting sounds. More commonly, however, noise has been shown to produce anxiety symptoms such as headache, nausea and irritability. One study indicated that mental hospital admissions are more numerous in noisy areas than in comparable quiet ones.

New words

diaphragm	n. 振动膜
propagate	v. 传播
eardrum	n. 耳鼓
logarithmic	a. 对数的
spectrum	n. 谱
parameter	n. 参数
fluctuate	v. 波动
hazardous	a. 危险的
epidemic	a. 流行性的
aver	v. 证明
forfeit	v. 丧失
peripheral	a. 末梢的
adrenal	a. 肾上腺的
extrapolate	v. 推断
gland	n. 腺
cardiovascular	a. 心血管的

Notes

1. This phenomenon, propagated through the air, is called a

sound wave.

“This phenomenon” refers to what is stated in the previous sentence. So this sentence, together with the previous one, is a definition of the term “sound wave”. 这一句以及前面一句都是对“sound wave”所下的定义。

2. There is a tremendous range, between the softest sound to which the human ear responds, such as the whisper of a leaf, and loudest sound to which it has been exposed, probably the liftoff of a rocket.

This sentence is relatively complex, but it is clearly organized(结构清晰). The basic structure of the sentence(句子的基本结构)is “There is a tremendous range between...and...”. “The whisper of a leaf” is an example of the softest sound, while “the liftoff of a rocket” is an example of the loudest sound. And the pronoun “it”, which is employed to avoid repetition(用来避免重复), stands for “the human ear”.

3. At one subcommittee hearing it was averred that.

In this sentence, the word “hearing” is a noun, which refers to a chance to be heard explaining one’s position (听证会).

4. Complex tasks are affected more than simple ones, and accuracy is reduced more than quantity. Noise affects complex tasks more than simple ones, and it reduces accuracy more than quantity (噪声对复杂的工作所产生的影响大于简单的工作,降低精确性的程度甚于数量).

Exercises

I. Make the best choice in each of the following questions according to the text.

1. Which of the following is mentioned as a source of non occu-

- pational exposure to noise in the text?
- a. farm machines b. airplanes
 - c. rock group d. construction sites
2. Which of the following types of noises is considered as helpful by the author?
- a. intermittent noises b. rhythmic noises
 - c. sudden noises d. high noises
3. What can set the eardrum vibrating?
- a. an object b. a telephone receiver
 - c. a sound wave d. a suitable surface
4. Which of the following is an impulsive sound?
- a. gunshot b. siren
 - c. rock-and-roll music d. whisper of a leaf
5. Which of the following is NOT true?
- a. Frequent exposure to noises of 80 db(A) or above may lead to diminished hearing ability.
 - b. A sufficient duration to sounds in the 70 to 80 db(A) may lead to diminished hearing ability.
 - c. Intermittent noise in the range of 70 db(A) does not seem to have much effect.
 - d. Steady state noise in the range of 90 db(A) does not seem to have much effect.

II. Fill the blank that precedes each of the following statements with a T if it is true or an F if it is false.

- _____ 1. Muscle responds voluntarily to sudden loud noises.
- _____ 2. Pilots tend to suffer from hearing damage.
- _____ 3. One of the effects caused by noises is the reduction of accuracy rather than quantity.
- _____ 4. If an ear cannot hear a sound between 20 and 20 000

Hertz, it must be abnormal.

- ___ 5. A decibel is a unit of measurement of hearing damage.
- ___ 6. The range of frequencies that can be heard by different species can vary.
- ___ 7. The eardrum and middle ear are easily damaged by noises.
- ___ 8. There are more cases of mental disorder in noisy areas than in quiet ones.
- ___ 9. Improper entertainment may lead to hearing damage, too.
- ___ 10. It is certain that loud noises will affect sexual and reproductive functions of humans.

III. Look up the following words and expressions in the dictionary and give their Chinese equivalents.

- | | |
|--------------------|-------------------|
| 1) vibration | 2) spectrum |
| 3) diaphragm | 4) vocalcords |
| 5) propagate | 6) adjacent |
| 7) audible | 8) eardrum |
| 9) decibel | 10) logarithmic |
| 11) parameter | 12) exemplify |
| 13) fluctuate | 14) siren |
| 15) middle ear | 16) epidemic |
| 17) peripheral | 18) nausea |
| 19) extrapolate | 20) adrenal gland |
| 21) cardiovascular | 22) incidence |
| 23) adverse | 24) equilibrium |

IV. Define the following terms.

- | | |
|---------------|--------------|
| 1) sound wave | 2) frequency |
|---------------|--------------|

3) decibel

4) spectrum

5) hearing damage

V. Complete the following table.

Physiological responses	Examples
1.	
2.	
3.	

VI. Reading comprehension

Man has been busy inventing things for a few hundred years now, such as the train, the car, the plane, besides machines of various kinds. Each one of these inventions added its share of noise when it came. Thus the noise of modern times has come to us gradually over a long period of time.

The roar of traffic, the screech of brakes, the clickety-clack of typewriters, the howl of transistor radios, the chug-chug of machinery! It is noise, noise everywhere and all the time. And

we live and work amidst it all. Truly ours is a noisy world. It is impossible to find a single moment when everything is quiet. Man has to live with noise day after day, hour after hour. Noise has become the curse of modern times. It is an evil that modern man cannot escape from, not at any rate for long. The result is he can hardly get to sleep, he cannot work efficiently, and at times he gets angry for no reason. Noise does great harm to the physical and mental health of modern man.

The economic costs to society of noise are great. Take airports for example. Many are currently operating at less than capacity because of noise regulations which restrict their hour of operation. At some airports no jet traffic is allowed from 11 p. m. to 7 a. m. Other airports restrict the use of certain runways. One estimate is that noise restrictions reduce possible airport use by 20 per cent. The profitable cargo trade is especially affected by night restrictions.

In the case of airports, jet engines may be modified to reduce their noise level, or insulation from air traffic noise may be provided by the purchase of land around airports or the insulation of buildings. One estimate is that \$5.7 billion would be required to equip all existing jet engines with noise control devices. However, considering the current state of the art, even taking this step will not reduce noise levels at all points to acceptable values. Some combination of methods is probably necessary.

If all aircraft were made quieter by existing methods, there would be a number of economic benefits. A decrease in the right-of-way needed for airports would be possible, and an increase in airport capacity would occur. Property values near airports might rise. Transportation costs to and from population airports