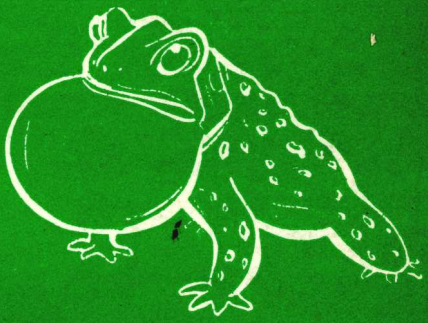
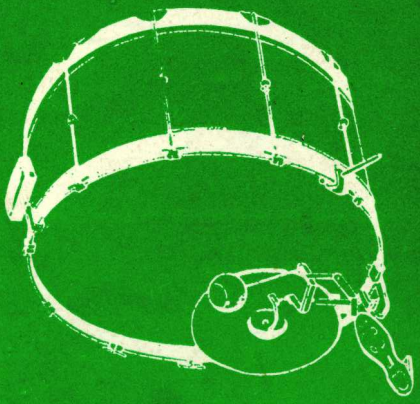


科普英语注释读物

SOUND

声

[美] B.M.Parker 著



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CONTENTS

1. What Causes Sound

Streetcars clang by.① People hurry along talking to one another.② A newsboy shouts one of the headlines in the latest paper. The engine of a car backfires. The brakes of another screech when the car is stopped by a red light. Big trucks rumble along. The policeman blows his whistle. How many sounds there are on a busy street corner.③

Some of these sounds are loud. Some are soft. Some are high. Some are low. Some are pleasant. Some are unpleasant. But they are all made in the same way. They are all made by the movement of something. All sound is made by movement. If nothing on the earth ever moved, there would be no sound of any kind on the earth.④

A rubber band lying in a box does not make any sound⑤. One stretched across the top of an open box⑥ does not make any sound either. But when you pluck a stretched rubber band with your finger, it does make a sound.⑦ It makes a sound because you have started it to moving back and forth.

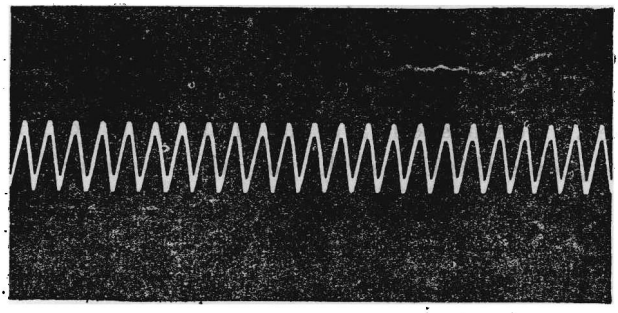
When anything is moving back and forth, we say that it is *vibrating*. You can see the rubber band vibrate⑧ after you pluck it.

You were told that⑨ all sound is caused by move-

ment. We can now be a little more exact. All sound is caused by *vibration.*

The girl in the picture on the left is holding a tuning fork. A tuning fork makes a soft hum when you strike the prongs. It makes a hum because you have set the prongs to vibrating.

The prongs move only a little way, and they move very fast. It is hard to see that they are vibrating.⑩ The picture above shows a good way of finding out that the prongs are vibrating. Notice the drops of water that the fork is flipping out as it moves back and forth.⑪ If you try this experiment for yourself, be careful to hold the fork so that⑫ just the ends touch the water.



The picture above is a magnified picture of a wavy line made by a humming tuning fork. A stiff hair fastened to one prong of the fork drew the line. The fork was struck. It was held so that the hair touched a sheet of paper covered with soot. Then the sheet of paper was pulled along.

This experiment will help you understand how the line was drawn. Rest the point of your pencil on a sheet of paper. Start moving it from side to side a little way. Then have someone pull the paper out from under it slowly.[13] The pencil will draw a wavy line.

When your doorbell rings, a tapper is hitting the gong of the bell and making it vibrate. In the alarm clock that wakes you up in the morning there is a gong that vibrates in the same way.

When the leaves of a tree rustle, the wind is making them vibrate. When a door slams shut, the wood of the door is set to vibrating.

Raindrops striking a window pane make the glass vibrate. A flash of lightning sets the air it passes

throu[redacted]

Di[redacted]ear? If yo[redacted]r of the sea. Conch shells are the shells of big sea snails. Many people think that the roar they hear in a conch shell is really the roar of the sea. Of course it is not. The roar of the sea could not be shut up in a shell. The sound is made by the vibration of the air inside the conch shell.

You hear some sounds so often that you can tell what they are easily.[16] But every day you are almost sure to hear some sounds that you do not know. If you should ever play detective and trace some of those sounds, you would be sure to come in the end to something that is vibrating.

New Words

streetcar ['stri:tkɑ:] *n.* (美)市内有轨电车
clang [klæŋ] *v.* (发出)玎珰声
hurry ['hʌri] *v.* 匆忙,赶紧
newsboy ['nju:zbɔi] *n.* 报童
headline ['hedlain] *n.* (报刊的)大字标题
engine ['endʒin] *n.* 引擎,发动机
backfire ['bæk'faiə] *v.* 回火,逆火
brake [breik] *n.* 制动器,刹车
screech [skri:tʃ] *v.* 尖叫;发出尖叫声
rumble ['rʌmbl] *v.* 隆隆作响;辘辘行驶
policeman [pə'li:smən] *n.* 警察
blow [bləu] (**blew** [blu:], **blown** [bləun]) *v.* (风)吹;(喇叭、口哨等)吹响
whistle ['hwisl] *n.* 口哨;汽笛
corner ['kɔ:nə] *n.* 角;(街道的)拐角
soft [sɔft] *a.* 软的;柔和的
pleasant ['pleznt] *a.* 令人愉快的
unpleasant [ʌn'pleznt] *a.* 令人不愉快的

ever ['evə] *ad.* 在任何时候
rubber ['rʌbə] *n.* 橡皮
band [bænd] *n.* 带，条
stretch [stretʃ] *v.* 伸展，伸长；(使)紧张
either ['aiðə, 'i:ðə] *ad.* 也，而且
pluck [plʌk] *v.* 拔，弹
finger ['fiŋgə] *n.* 手指
forth [fɔ:θ] *ad.* 向前(方)
vibrate [vai'breit] *v.* 摆动；振动；震荡
exact [ig'zækt] *a.* 确切的，精确的
vibration [vai'breiʃən] *n.* 摆动；振动；震荡
tune [tju:n] *v.* 为…调音
fork [fɔ:k] *n.* 叉
hum [hʌm] *n.* 嗡嗡声
strike [straik] (struck [strʌk], struck 或 striken ['strikən]) *v.* 打，击，敲
prong [prɔŋ] *n.* 叉之一股，叉尖
notice ['nəutis] *v.* 注意
flip [flip] (flipped, flipping) *v.* 把…往上抛，掷
touch [tʌtʃ] *v.* 触(及)
magnify ['mægnifai] *v.* 放大，扩大
wavy ['weivi] *a.* 波形的
stiff [stif] *a.* 硬的
hair [hɛə] *n.* 头发
fasten ['fɑ:sn] *v.* 使…固定
draw [drɔ:] (drew [dru:], drawn [drɔ:n]) *v.* 画，绘制
soot [sut] *n.* 煤烟，烟灰
pull [pul] *v.*, *n.* 拉，拖，牵
rest [rest] *v.* (使)停止，(使)休息
doorbell ['dɔ:bel] *n.* 门铃
ring [riŋ] (rang [ræŋ], rung [rʌŋ]) *v.* (钟，铃等)鸣，响
tapper ['tæpə] *n.* 电键，铃舌
hit [hit] (hit, hitting) *v.* 打(击)，击中
gong [gɔŋ] *n.* 锣；铃盖
bell [bel] *n.* 钟；(门)铃
alarm [ə'lɑ:m] *v.* 报警
wake [weik] (waked, woke [wəuk], waked, woke, woken ['wəukən]) *vi.* 醒来，醒着 *vt.* 唤醒，弄醒
rustle ['rʌstl] *v.* 发出瑟瑟声
slam [slæm] (slammed, slamming) *v.* 使劲关，砰地关上
raindrop ['reindrɔp] *n.* 雨滴
pane [pein] *n.* 窗玻璃片
flash [flæʃ] *n.* 闪光
thunder ['θʌndə] *n.* 雷(声)
conch [kɔŋk] (*pl.* conch(e)s) *n.* 贝壳；海螺
shell [ʃel] *n.* 壳，甲
roar [rɔ:] *n.* 吼叫，咆哮
snail [sneil] *n.* 蜗牛
inside ['in'said] *prep.* 在…里面
detective [di'tektiv] *n.* 侦探
trace [treis] *v.* 追踪

Phrases and Expressions

one another 互相，彼此
in the same way 同样地
back and forth 前前后后
a little way 一点点
a sheet of 一张
from side to side 从一边到另一边
of course 自然，当然
(to) come to 达到；归结为…
in the end 最后，最终
conch shell 海螺

Notes

① clang by: 从旁边玎玎琅琅地过去。by 此处是副词。英语中有很多简单介词，都可用作副词，通常跟在动词后面，作时间状语或地点状语，一般要重读。如：

A car drove *past*. 一辆小汽车开过去了。

Despite the fine weather, we stay *in* all day. 天气虽好，我们却整天呆在家里。

② talking to one another: 这是一个后置的分词短语，是对 hurry along 的补充说明，也可改成 and talk to one another 这一形式。

③ How many sounds there are on a busy street corner! 这是一个惊叹句。惊叹句常以 how, what 开头，它所修饰的部分也随同前移。如：

What a fine day it is! 多好的天气啊！(比较 It is a fine day.)

How glad I am to see you! 看到你多高兴啊！(比较 I am glad to see you.)

④ If nothing on the earth ever moved, there would be no sound of any kind on the earth.

这个句子所说的是假设的事实，所以谓语动词用虚拟语气(从句谓语动词用过去式，主句谓语为 would +原形动词)。

⑤ A rubber band lying in a box does not make any sound.

(现在)分词短语 lying in a box 修饰前面的名词 band，作定语；不定冠词 a 此处表示类别，不是"一个"之意。

⑥ One stretched across the top of an open box…：过去分词短语 stretched across the top of an open box 修饰前面的名词 one，作定语；one 此处是名词，指"某一根橡皮筋"。

⑦ it does make a sound：句子里的 does 加强动词 make 的语气。英语中，do(es), did 有时可用以加强陈述句谓语动词的语气，此时要重读。如：

There aren't many questions left, yet they *do* exist. 遗留的问题不多了，但确实还有。

He doesn't often visit me, but when *does* visit me, he stay for hours. 他不常来看我，但当他真的来了，他一呆就是几个钟头。

⑧ You can see the rubber band vibrate：句中名词 band 为宾语，动词不定式短语 (to) vibrate 为宾语补足语。注意有些动词的后面，要求"**名词(或代词宾格)＋动词不定式**"；前一部分叫宾语，后一部分叫宾语补足语，合称复合宾语。宾语和宾语补足语之间在逻辑上通常为主谓关系。如：

Nothing causes *the body to move*. 没有什么能使此物体运动。(比较 The body moves.)

另外，在 make, see, hear, let, have 等动词后面，不定式符号 to 被省略。如：

I will let *you have news*. 我会让你得到消息的。

What makes *you think so*? 什么使你这样想的？

⑨ You were told that：这是一个被动语态的句子。原来主动句中谓语动词 tell 的一个宾语 you，在被动句中成为主语，另一个宾语(此处为从句)保留不动。比较下面的句子：

Comrade Wang told *us something* about vibration. (主动句)

We were told *something* about vibration (by Comrade

Wang). (被动句)

Something about vibration was told *us* (by Comrade Wang). (被动句)

⑩ It is hard to see that they are vibrating. 句中 it 为形式主语(没有词义)，代替后面的不定式短语(真正主语) to see …。

⑪ Notice the drops of water that the fork is flipping out as it moves back and forth. 这是一个主从复合句。主句是以原形动词 notice 开始的祈使句；that 引导的是定语从句，修饰它前面的名词 drops；as 引导的是时间状语从句，修饰 is flipping out.

⑫ so that 此处引导一个目的状语从句。

⑬ pull the paper out from under it slowly: pull out 此处作"抽出"解，out 为副词；from under (从…下面) 是连用的二个介词。又如:

He came out *from behind* a tree. 他从一棵树后面走出来。

⑭ lightning sets the air it passes through: it passes through 为修饰主句中名词 air 的定语从句，它前面的关系代词 that (或 which) 作从句介词 through 的宾语，所以省去。

⑮ If you ever did …: did 代替前句 held a big conch shel up to your ear. 注意 do(es), did 常可用来代替前面的动词及其从属部分，以避免重复。

⑯ so often that you can tell what they are easily: (so) … that 此处引导一个结果状语从句；what 引导一个名词从句，作 tell 的宾语；副词 easily 作 tell 的状语，放在句末，表示强调。

2. How Sound Travels

Alex and Jack were camping in the woods for the night. They had just gone to bed in their tent when a hoot owl began to hoot.① Then from the lake near by② a loon cried. A little while later a branch fell from a tree. And some animals began rustling the leaves close to the tent.③ The boys could not go to sleep.

"I wish we were on the moon,④" Alex said.

"Why?" Jack asked.

"If we were," Alex explained, "there wouldn't be any noise, and we could go to sleep. There wouldn't be any noise to keep us awake, because it hasn't an atmosphere like ours.⑤"

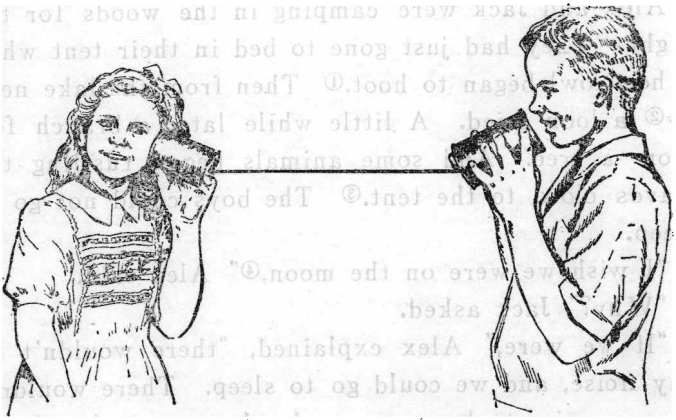
Alex was right. The moon is a very quiet place, because it has little or no atmosphere.

Sound is caused by vibrations. But there must be something to carry the sound to our ears. Sound can not travel through empty space.

Suppose an electric bell is ringing. The gong of the bell is vibrating. The moving back and forth of the metal in the gong⑥ sets up sound waves in the air around it. These sound waves are a little like the ripples that you see on the surface of a pond when you throw a pebble into the water.

But there are two important differences between

sound waves and the ripples in the pond. You can see the ripples, and they move out only on the surface of the water. You cannot see sound waves, and they move out in all directions unless there is something to stop them.⑦



There is an experiment that is often done to show that sound cannot travel through empty space.⑧ An alarm clock is set. It is hung from the top of a glass jar shaped like a bell. Then the air is pumped out of the jar with an air pump. When the alarm clock goes off, you do not hear it. The sound cannot travel through the empty space around the clock.

Sometimes stars explode. But we never hear them. No sound can travel through the empty space between us and the stars.

But in air sound travels very well. Often savages send messages for long distances by beating tom-toms. In the mountains of Switzerland people have learned

to yodel. When they yodel, they can make themselves heard across wide valleys.⑨

Sound can travel around corners. Light cannot. If a person around a corner from you is talking, you can hear him, but you cannot see him.

A cheer-leader at a football game uses a megaphone. He wants the sound waves from his voice to go in one direction, not in all directions. A megaphone is a help. A band shell works very much like a megaphone.

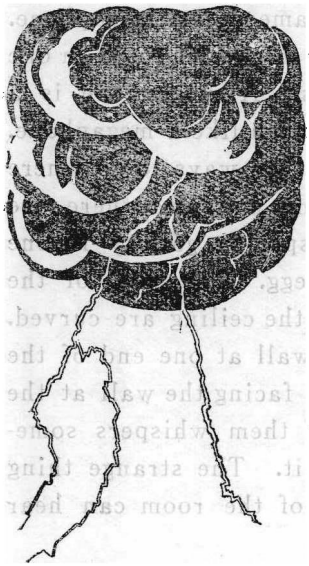
Sound waves can be made in other ways to go where we want them to go.⑩ In some museums there are whispering galleries. The whispering gallery in one big museum is shaped like an egg. The floor of the room is flat, but the walls and the ceiling are curved. One person stands facing the wall at one end of the room. The other person stands facing the wall at the other end of the room. One of them whispers something, and the other one hears it. The strange thing is that⑪ no one in the middle of the room can hear the sound.

The whispering gallery works in this way. The first person talks against the wall. The sound waves hit the wall and are *reflected*. They spread out as they travel through the room. But the curved ceiling and walls make them come together again at the far end of the room. We say that the walls *focus* the sound waves. When they hit the end of the room, they are reflected to the person standing there.

The sound waves are so spread out in the middle of the room that they cannot be heard there. But

they can be heard after they are focused.

There are some whispering galleries that were not meant to be whispering galleries.[12] A room may happen to be shaped so that a faint sound in one part of the room is heard clearly in another part of the room, although it cannot be heard in between the two places.



Most of the sound that reaches our ears travels to them through the air. But sound can travel through other materials. It can travel through some of them better than it can travel through air.

Long ago people learned to put their ears to the ground to hear whether anyone was coming.[13] The sound of approaching footsteps is carried through firm ground better than through air.

A watch lying on a bare table can be heard much better if you put your ear down on the table. Sound travels well through solid wood. It travels well through metal, too. People often send mes-

sages that they need more heat by tapping on radiators. The sound travels down to the furnace room through the metal of the pipes that lead to the radiators.

Clapping two stones together under water while your head is under water makes a deafening noise.⑭ Water, too, carries sound well.

The children in the picture on page 10 are talking to each other over a tin-can telephone. The two cans atre joined by a strong cord that is stretched very tight. Talking into a can makes the bottom of the can vibrate. The vibrations travel along the cord. They make the bottom of the other can vibrate.

Sound waves can be made to do funny tricks. You may have a tin dog that comes out of its house when you shout at it. There is a toy of that kind. When the sound waves strike a piece of metal on the toy, this piece of metal begins to vibrate. It moves enough to set loose a spring⑮. The spring makes the dog come out of the door of its house.

New Words

ravel ['trævl] (travel(l)ed, travel(l)ing) *v.* 旅行，运行；传播
Alex [ə'leks] 亚列克斯(男子名)
Jack [dʒæk] 杰克(男子名)
camp [kæmp] *v.* 野营 *n.* 营地
tent [tent] *n.* 帐篷
hoot [hu:t] *v.* (枭)嘁嘁地叫 *n.* 枭叫声
owl [aul] *n.* 枭，猫头鹰
loon [lu:n] *n.* (捕鱼的)潜水鸟
branch [brɑ:ntʃ] *n.* 枝；分枝
animal ['æniməl] *n.* 动物
wish [wiʃ] *v.* 愿，希望
explain [iks'plein] *v.* 解释
noise [nɔiz] *n.* 喧闹声，嘈杂声
awake[ə'weik](awoke[ə'wəuk], awoke 或 awaked) *v.* 唤醒
atmosphere ['ætməsfiə] *n.* 大气
empty ['empti] *a.* 空的