TAIPEI TIMES
# BILINGUAL TIMES
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**WELCOME** to Weekend Science! Every Saturday we're going to guide you through some cool experiments that you can do at home. It's a good idea for you to keep a record of what you do in a Science Journal. That way you can record what you learn, compare results and maybe use them to design new experiments! Remember to always ask a grown-up's permission before trying out an experiment.

歡迎閱讀《週末科學版》！我們每週六都要為你介紹可以在家中進行的有趣科學實驗。你可以在《科學日誌》中記錄自己做了哪些活動，這樣就可以將所學的記錄下來，比較這些結果，也許還可以利用它們來設計新的實驗！先看一下《科學日誌》的點子再開始吧。展開實驗之前，記得要獲得大人許可喔！

WEEKEND SCIENCE

# Working with waves: testing radio signals

## 測試無線電波訊號

**Dr. Drew Pinsky, better known as radio and TV personality "Dr. Drew," poses for a photo at the Westwood One studios in Culver City, California, US, on Oct. 17, 2008.** PHOTO: AP
十月十七日，廣電名人「朱爾醫師」朱爾．品斯基醫師，在美國加州卡爾佛市的維斯伍德一號廣播公司接受媒體拍攝。 照片：美聯社

Before video games, television and the Internet, for many people the only source of home entertainment was the radio. Radio stations first appeared in the 1920s and rapidly spread due to huge public demand for "free" music.

在電玩遊戲、電視和網路出現前，許多人的家庭娛樂來源就只有廣播。廣播電台最早出現於一九二０年代，因大眾對「免費」音樂的廣大需求而迅速普及。

The **technology** behind the spread of radio was the sending and receiving of **radio waves**. One reason why radio waves are so effective is because they travel easily through air, but can't easily penetrate the earth's atmosphere. That's because the lower atmosphere is a good **transmitter** of radio waves, while the upper atmosphere deflects them back to ground level.

廣播傳遞的原理就是利用無線電波的發送和接收。無線電波之所以如此有效地傳播，原因之一就是它們可輕易經由空氣傳遞，卻不容易穿透地球的大氣層；那是因為低層大氣是良好的無線電波傳導體，而高層大氣則會把無線電波反射回地表之故。

In today's experiment you will conduct an experiment on some household items to find out how they fare at conducting radio waves.

在今天的實驗中，你將測試部份日常用品對無線電波的導效果。

What you will need: a radio controlled car and controller, a large outdoor area, aluminum foil, wax paper, rubber gloves and a plastic bag.

實驗所需：一台無線電遙控車和控制器、一處寬敞的戶外場地、鋁箔紙、料理用腊紙、橡膠手套和一個塑膠袋。

(JOHN PHILLIPS, STAFF WRITER)

(翻譯：袁星慶)

## METHODOLOGY 方法

Step 1: Test the car and controller and make sure you have fresh batteries in both.
Step 2: Wrap the car's **antenna** in the material you want to test, for example aluminum foil.
Step 3: Record whether or not the car moves.
Step 4: Change the material, and test again. Continue until you have used all the materials.

步驟一：測試遙控車和遙控器，確認兩者的電池電力充足。
步驟二：把遙控車的天線用你想測試的材料包覆起來，如：鋁箔紙。
步驟三：記錄車子是否移動。
步驟四：更換材料後再測試一次。如此持續進行，直到測試完所有材料為止。

## VARIATIONS 實驗延伸

The chances are that your car will move regardless of the **material** you use, so you may want to be more **scientific**.

不管你使用什麼材料，遙控車可能都會移動，因此你或許會想更精確地實驗。

Variation 1: Measure out a straight line. It doesn't matter how long it is, but about 25m would work well. Use a stopwatch to time how long it takes the car to travel the distance. One at a time, wrap the antenna in the different materials and time the car over the distance.

變化一：仔細量劃出一段直線距離，長短沒有關係，但二十五公分左右效果最佳。用計時碼表測量遙控車行駛這段距離所花的時間。分別用不同的材料包覆天線，並測量每次遙控車行駛這段距離所花的時間。

Variation 2: Find a large empty space. Drive the car in a straight line until the signal is so weak that the car stops. Measure the distance by pacing it out. Change the material and do it again.

變化二：找個寬敞空曠的地方，操縱遙控車朝直線方向前進，直到訊號微弱到車子停下來為止。利用步長測量出這段距離，然後再換一種材料測試一次。

Variation 3: Conduct a similar experiment on a radio. This time wrap the aerial in different materials and record the strength of the signal. Can you think of a way of objectively measuring the volume?

變化三：對一台收音機進行相似的實驗。這次，分別用不同的材料包覆收音機的天線，然後記錄每次訊號的強度。你能想出客觀測量音量的方法嗎？

## CONCLUSION 結論

Present your findings in a graph. From the graph you will be able to identify the materials that allow radio waves to pass through, and those that block them.

將實驗結果製成一張圖表。從圖表中，你就能分辨出無線電波可以穿透過哪些材料，哪些材料又會阻擋電波。

## VOCABULARY 今日單字

1. **technology** /tɛkɛnɛlɛɛɛ/ n.
科技 (ke1 ji4)
2. **radio wave** /ɛredɛ,o ɛwev/ n.
無線電波 (wu2 xian4 dian4 po1)
3. **transmitter** /trænsɛmɛtɛ/ n.
傳遞者 (chuan2 di4 zhe3)
4. **antenna** /ænɛtɛnɛ/ n.
天線 (tian1 xian4)
5. **scientific** /,saɛɛnɛtɛfɛk/ adj.
科學的 (ke1 xue2 de5)，精確的(jing1 que4 de5)
6. **material** /mɛɛtɛrɛɛl/ n.
材料 (cai2 liao4)

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Did you have fun with today's experiment? Why don't you e-mail us and let us know. We're always happy to hear from our readers!
喜歡今天的實驗嗎？歡迎來函指教！電子信箱：bilingual@taipeitimes.com


P13 Bilingual 紅藍黃黑