



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囉！

Boomerang aerodynamics 回力標的空氣動力學原理

Modern boomerangs are usually used as toys or sports equipment, but their original use was much more important. A carefully thrown boomerang will return to its thrower, which made it a great **hunting** tool for early **civilizations**. Hunters used boomerangs in two ways — either to scare birds out of trees and into nets, or to inflict a direct strike on a larger animal. Due to their range and **accuracy**, it's highly likely that boomerangs were also used in combat with other humans.

(JOHN PHILLIPS, STAFF WRITER)

In today's experiment you will make a boomerang and learn about the aerodynamics that give boomerangs their special properties.

What you will need: three ice pop sticks, some card and some putty-like **adhesive**.

METHODOLOGY

Step 1: Roll the adhesive into three balls about the size of a pea and stick one about 2cm from the top of each ice pop stick.

Step 2: Take one of the sticks (stick A) and place it on the table so the adhesive is face up. Next, take another stick (stick B) and attach it to stick A, with the adhesive facing down.

Step 3: Take stick C and attach it so that it's above stick A and below stick B. There should be an equilateral triangle in the middle where the sticks intersect.

Step 4: Cut the card into three equally sized rectangles, about 3cm x 5cm. Use a small amount of adhesive to attach the card to the ends of the sticks.

Step 5: The boomerang is finished! Throw it and watch it return to you.

HOW IT WORKS

A boomerang relies on complex aerodynamics and something called gyroscopic precession to make its return flight. The wings are all at different angles, which means air travels over them at different speeds. The air tries to **tip** the boomerang over, which changes its angle of flight and sends it back to its **owner**.

實驗原理

回力標之所以會飛返，靠的就是複雜的空氣動力學及陀螺進動效應。標翼的角度各不相同，空氣流經的速度也會不同。空氣會使回力標傾斜，這會改變它飛行的角度，讓它飛回投擲者手中。



British Formula One driver Lewis Hamilton throws a boomerang in Melbourne, Australia, on March 13, 2008.

二〇〇八年三月十三日，英國一級方程式賽車手路易斯·漢米爾頓在澳洲墨爾本投擲回力標。

PHOTO: EPA
照片：歐新社

現代回力標常被當作玩具或體育用品，其實它們原本的用途重要多了。小心擲出的回力標會折返投擲者手中，這讓它成為早期文明的絕佳狩獵工具。獵人不是使用回力標來驚嚇樹上的鳥，讓牠們掉到網子裡，就是直接拿來攻擊較大型的動物。由於其射程和準確性，回力標也很可能被拿來作為人類格鬥的工具。

(翻譯：袁星塵)



今天的實驗中，你將自己動手做一個回力標，並了解回力標這種特質的空氣動力學原理。

實驗所需：三根冰棒棍、一些硬紙板和黏土膠。



方法

步驟一：將黏土膠捏成三顆豌豆大小的小球，然後將它們分別黏在三根冰棒棍上、距離頂端約兩公分處。

步驟二：將其中一根冰棒棍（A棍）放在桌上，讓黏膠面朝上。接著，將另外一根冰棒棍（B棍）黏膠那面朝下，黏在A棍上。

步驟三：將C棍黏在A棍之上、B棍之下；三根棍子交疊構成的中間區域應該會形成一個等邊三角形。

步驟四：將紙板剪出三個大小相同的矩形，大小約3×5公分。用少量黏土膠將三塊紙板固定在三根棍子的另一端。

步驟五：回力標完成了！拋擲後，看著它折返手中吧。

VOCABULARY 今日單字

- 1. hunting** / h n t ŋ / n.
狩獵 (shou4 lie4)
- 2. civilization** / s vl ze n / n.
文明 (wen2 ming2)
- 3. accuracy** / ækj r s / n.
準確性 (zhun3 que4 xing4)
- 4. adhesive** / d his v / n.
黏著劑 (nian2 zhuo2 ji4)
- 5. tip** / t p / vi./vt.
使翻倒 (shi3 fan1 dao3)
- 6. owner** / on / n.
所有人 (suo2 you3 ren2)



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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