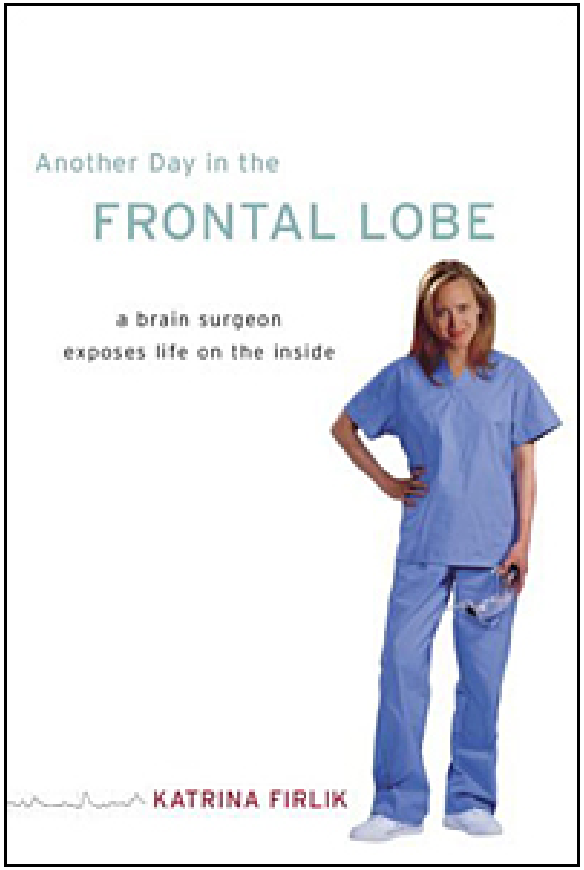
Excerpt: 'Another Day in the Frontal Lobe'

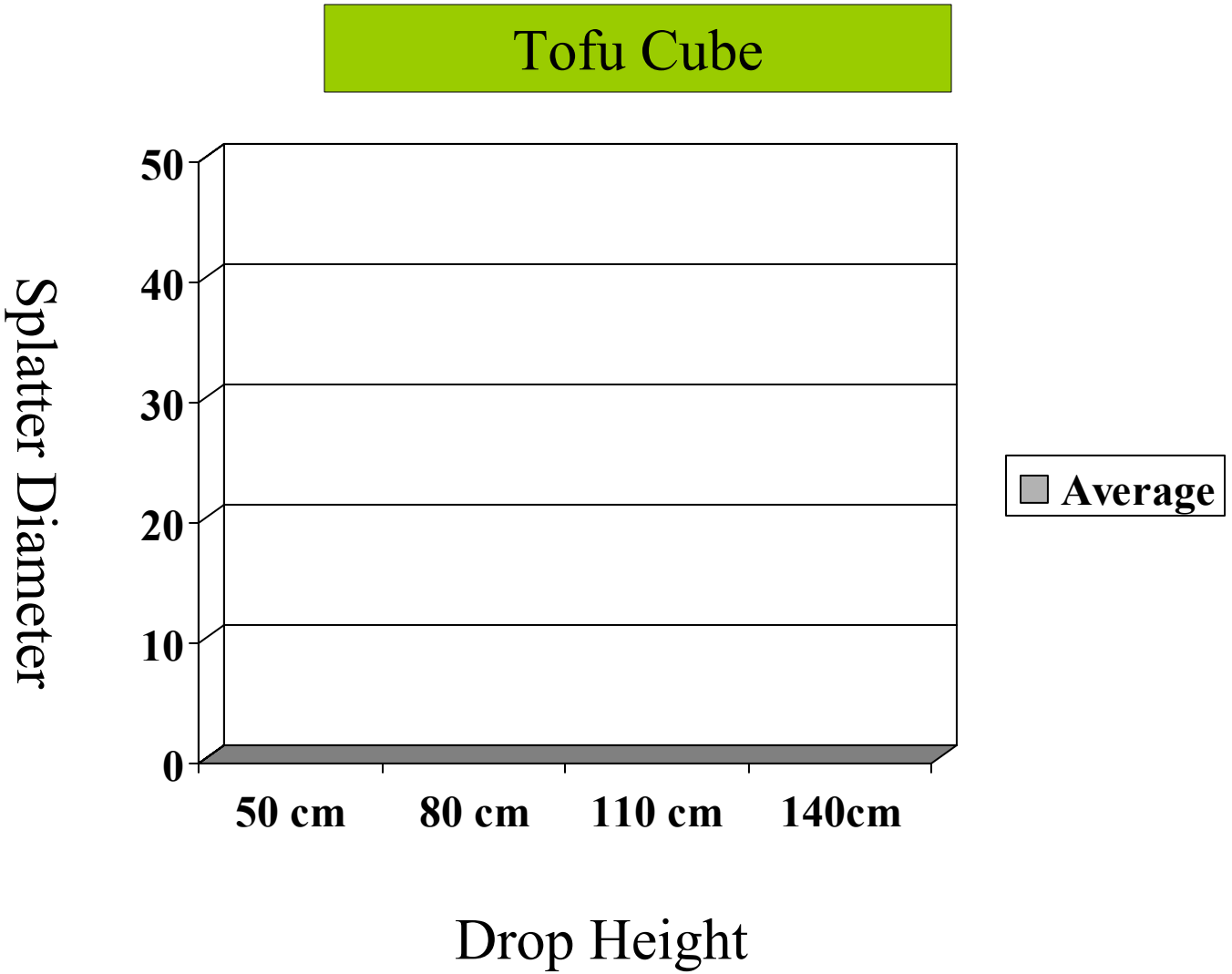
by Katrina Firlik

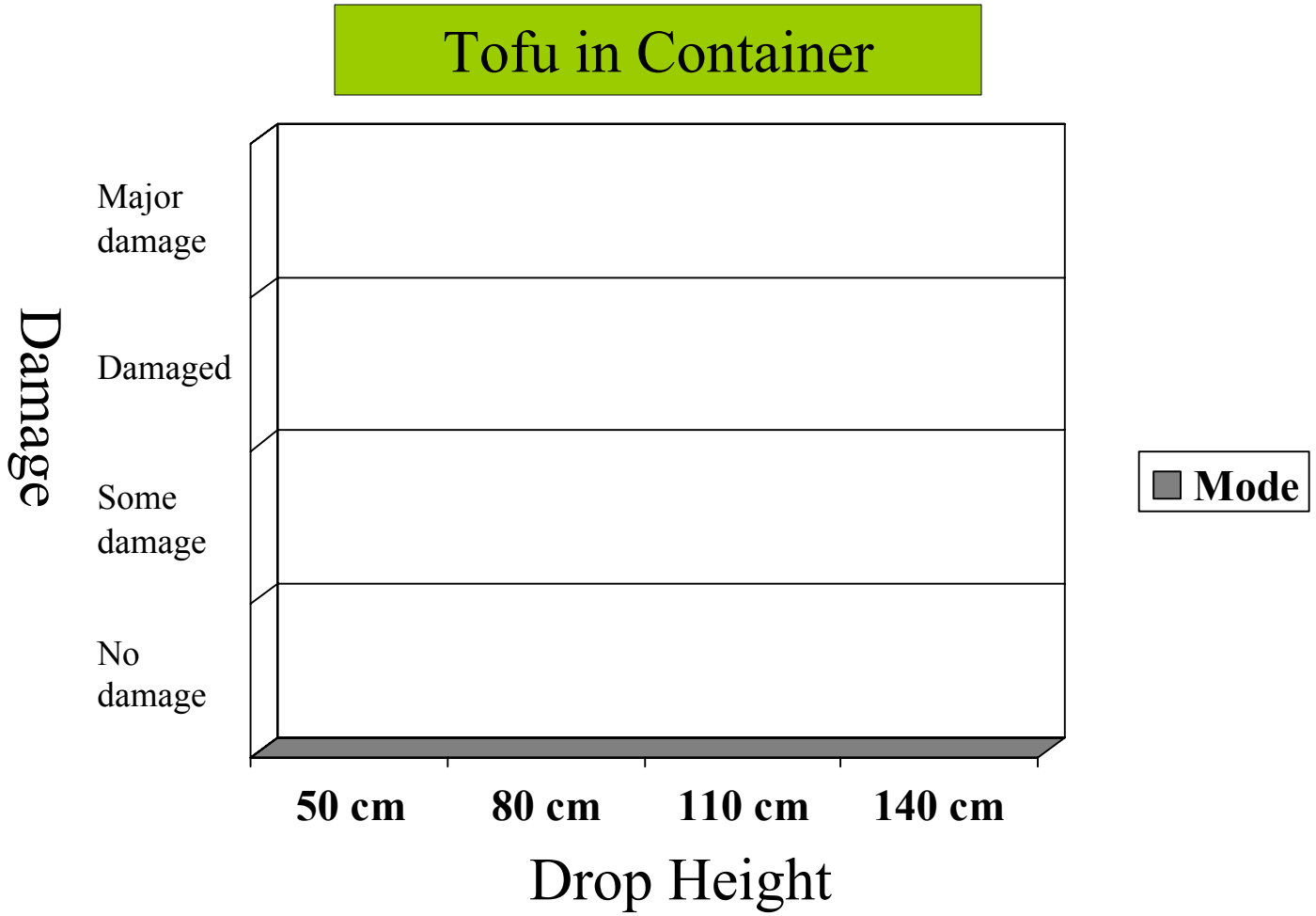
A Surgeon's-Eye View of the Brain

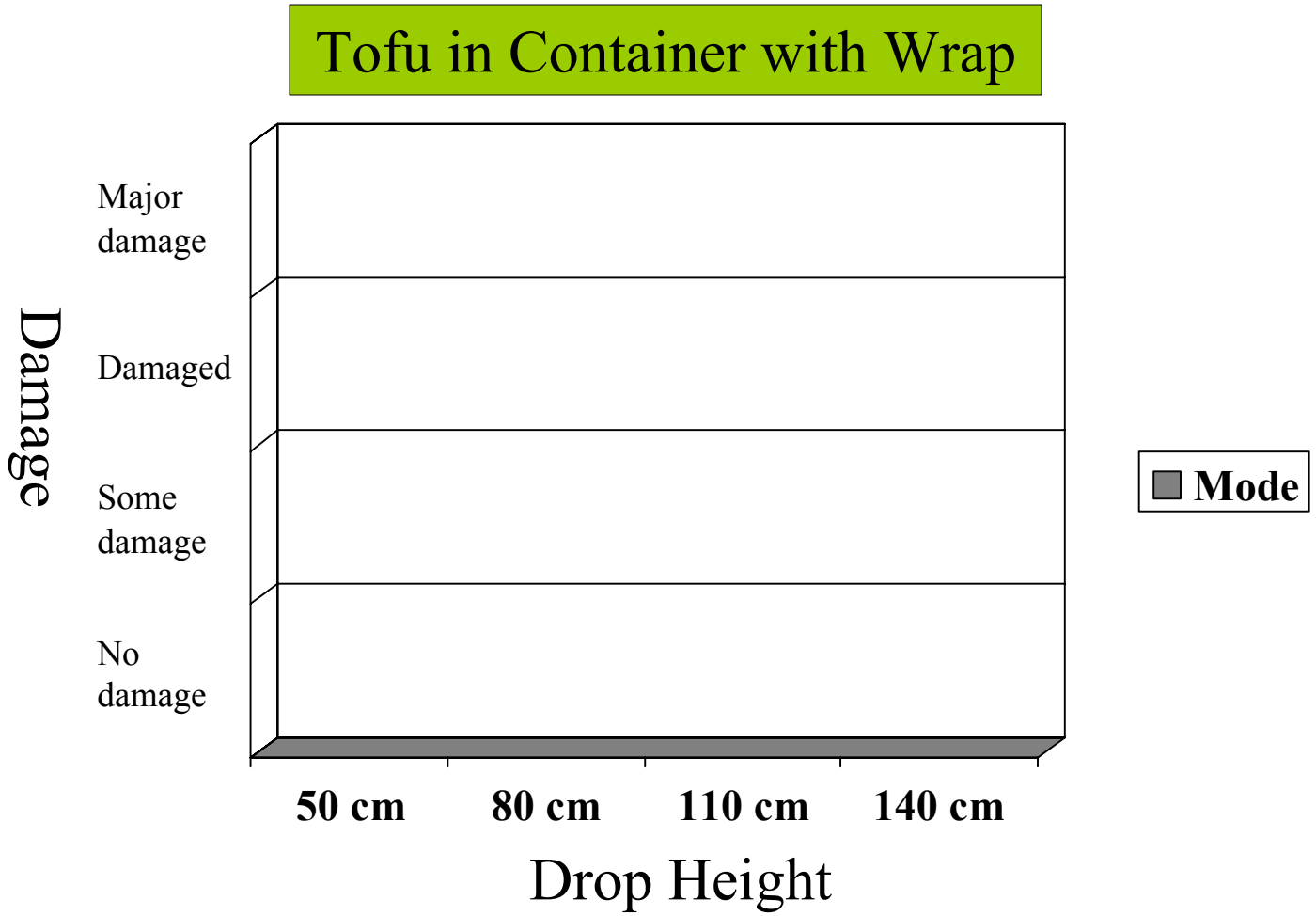
- *Fresh Air from WHYY*, May 10, 2006 · Neurosurgeon Katrina Firlik's new book is *Another Day in the Frontal Lobe: A Brain Surgeon Exposes Life on the Inside*. Firlik is now a private practitioner in Greenwich, Conn., and a clinical assistant professor at Yale University School of Medicine. She is also the daughter of a surgeon.

- The brain is soft. Some of my colleagues compare it to toothpaste, but that's not quite right. It doesn't spread like toothpaste. It doesn't adhere to your fingers the way toothpaste does. Tofu -- the soft variety, if you know tofu—may be a more accurate comparison. If you cut out a sizable cube of brain it retains its shape, more or less, although not quite as well as tofu. Damaged or swollen brain, on the other hand, is softer. Under pressure, it will readily express itself out of a hole in the skull made by a high-speed surgical drill. Perhaps the toothpaste analogy is more appropriate under these circumstances.




Tofu Cube
Splatter Diameter
50
40
30
20
10
0
50 cm
80 cm
110 cm
140cm
Drop Height
Average

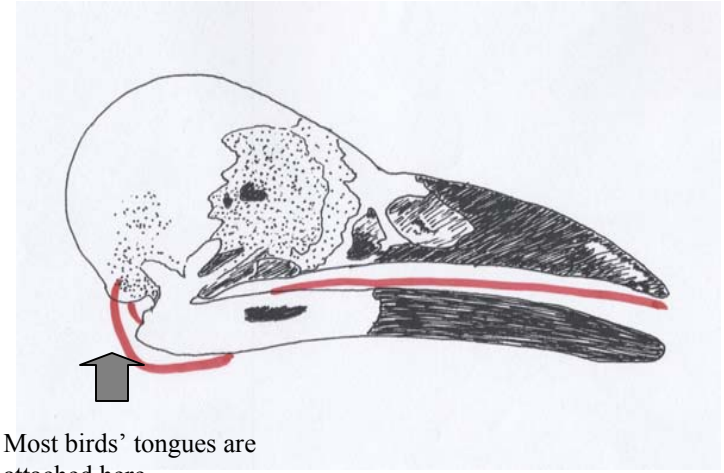

Tofu in Container
Damage
Major damage
Damaged
Some damage
No damage
50 cm
80 cm
110 cm
140 cm
Drop Height
Mode


Tofu in Container with Wrap
Damage
Major damage
Damaged
Some damage
No damage
50 cm
80 cm
110 cm
140 cm
Drop Height
Mode

Nature's Shock Absorber

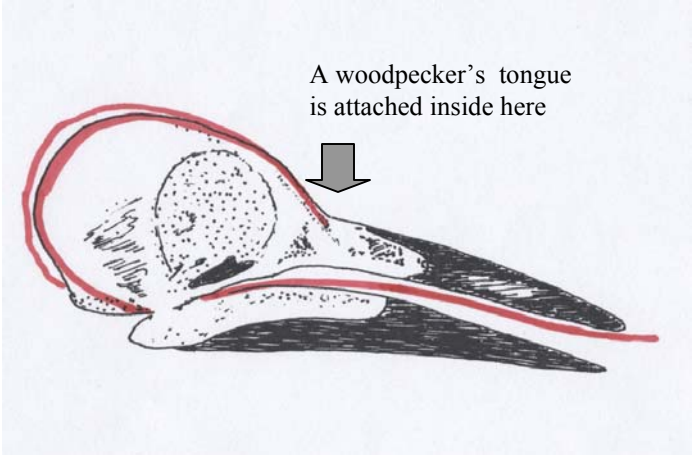
Woodpeckers peck at trees hundreds of times a day at speeds of about 16 miles per hour. Why do they not seem to get headaches? They can protect their brains from damage because their :

- skull has spongy bone (lots of small holes) to absorb impact
- skulls have less fluid for the brain to move in than we do
- brain is relatively small
- brain is cradled by their tongue

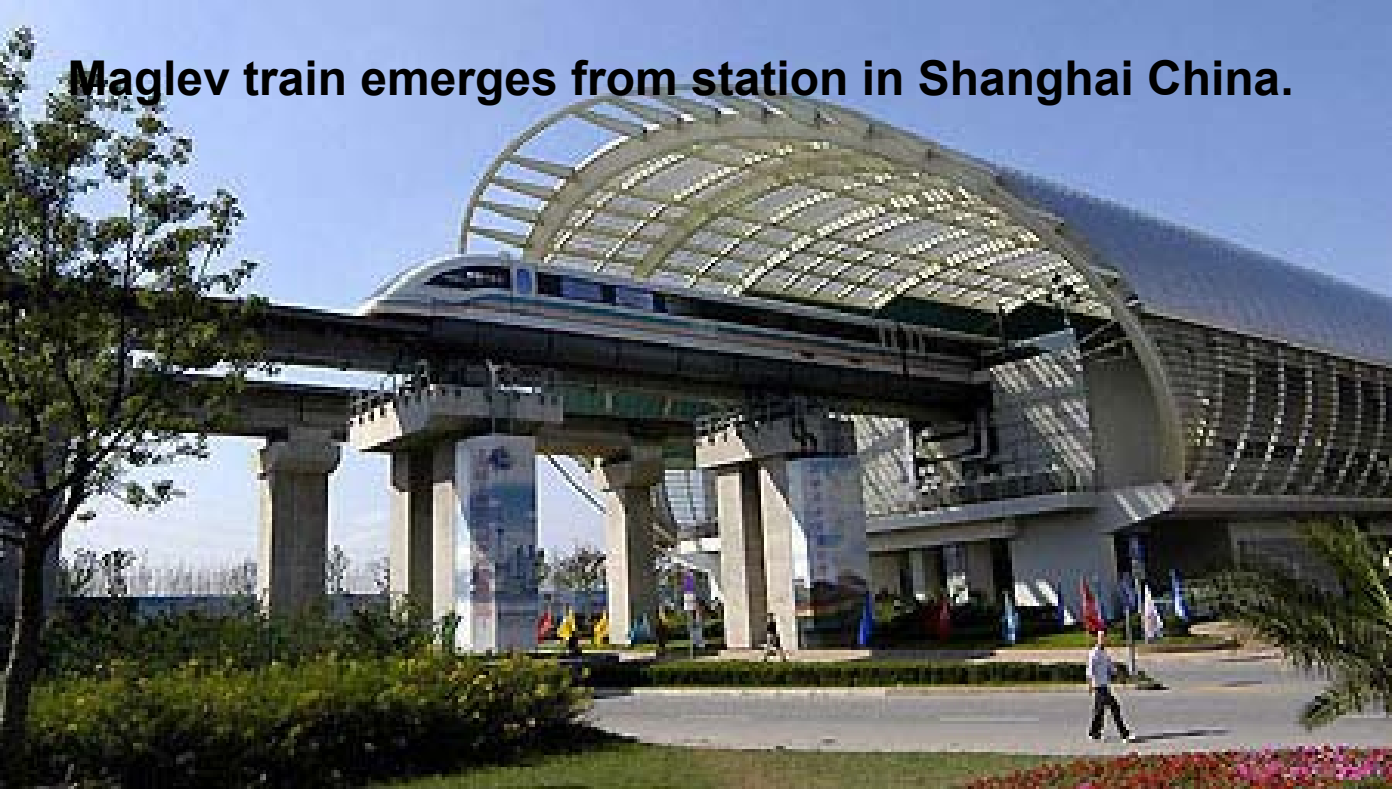


Most birds' tongues are attached here

Unlike the tongues of humans, which are mostly muscle, the tongues of birds split at the base and have a cartilage-and-bone skeleton called the hyoid apparatus. While they are pecking, their tongue wraps around their soft brain like a sling and holds it in place and absorbs impact.



Absorbing the shock of impact is what helmets do for our brains.



Maglev train emerges from station in Shanghai China.

Maglev trains

Construction of the first commercial Maglev (Magnetically Levitated) train began in April 2001. The system was up and running by 2004. The 30-km line runs between Pudong Shanghai International Airport and the Shanghai Lujiazui financial district. An end-to-end ride takes about eight minutes. A world record for commercial maglev systems was set on November 12, 2003. When a five-section train achieved the top speed of 501 km/h (311 mph) while another vehicle passed at 430 km/h (267 mph) on the adjacent track. The Maglev train in Shanghai has a design speed of over 500 km/h (310 mph) and a regular service speed of 430 km/h (267 mph). Shanghai Maglev is the fastest railway system in commercial operation in the world.

How do you suppose they are able to travel at such speeds?

Information found at http://www.monorails.org/tMspages/MagShang.html

What factors affect the rate of speed of snowboarders and skiers?

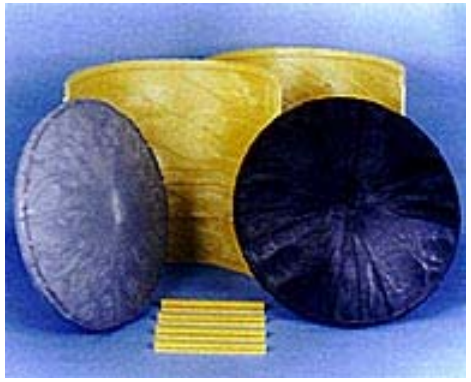
If we have more mass do we have more inertia?

How can we test this statement?

Using Hot Wheels set up an experiment to prove or disprove this statement.

Fitch Barriers

The Fitch Highway Barrier System, invented by race car driver John Fitch, is made of a series of sand-filled yellow plastic barrels with black lids. You have probably seen them at the tip of a guardrail between a highway and an exit lane, along the most likely line of impact. The barrels in front contain the most sand, with each of the following barrels containing less; so that when a vehicle collides with the barrels they shatter, the kinetic energy is dispersed by scattering the sand, and the vehicle decelerates smoothly instead of violently striking a solid object, reducing the risk of injury to the passengers.



Fitch barriers are used all over because they work well, they're low cost, and easy to set up and to repair. It is estimated that they have saved as many as 17,000 lives since they were introduce in 1960.

Fitch says that the design was inspired by sand-filled fuel cans which he used to protect his tent from strafing during World War II.

References:

en.wikipedia.org/wiki/**Fitch_Barrier**
http://www.racesafety.com/fitchbarr.html

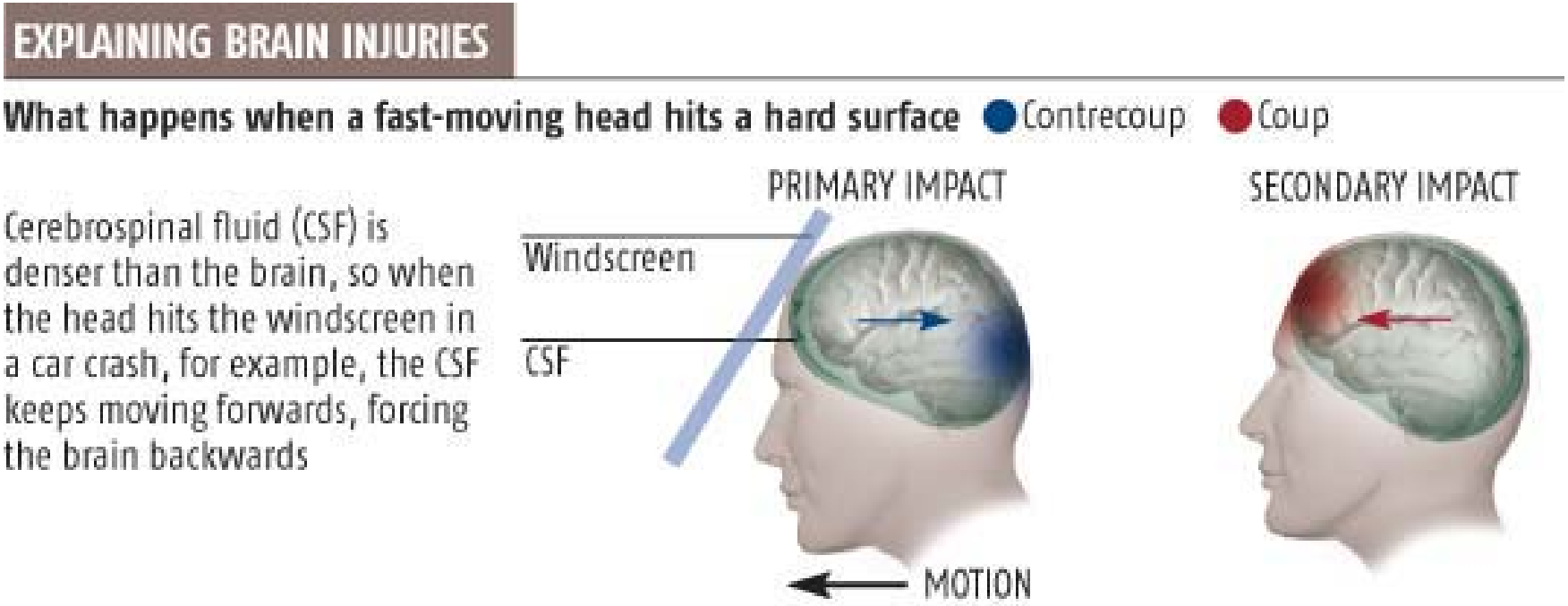
Through the eye of a physicist

Explain the following scenario:

Journal Time

- In what way did the car's inertia affect the rider?
- To what extent did the rider's inertia affect the out come?
- In what way might a bicycle helmet have helped this rider?
- What might you infer if the car had been moving?

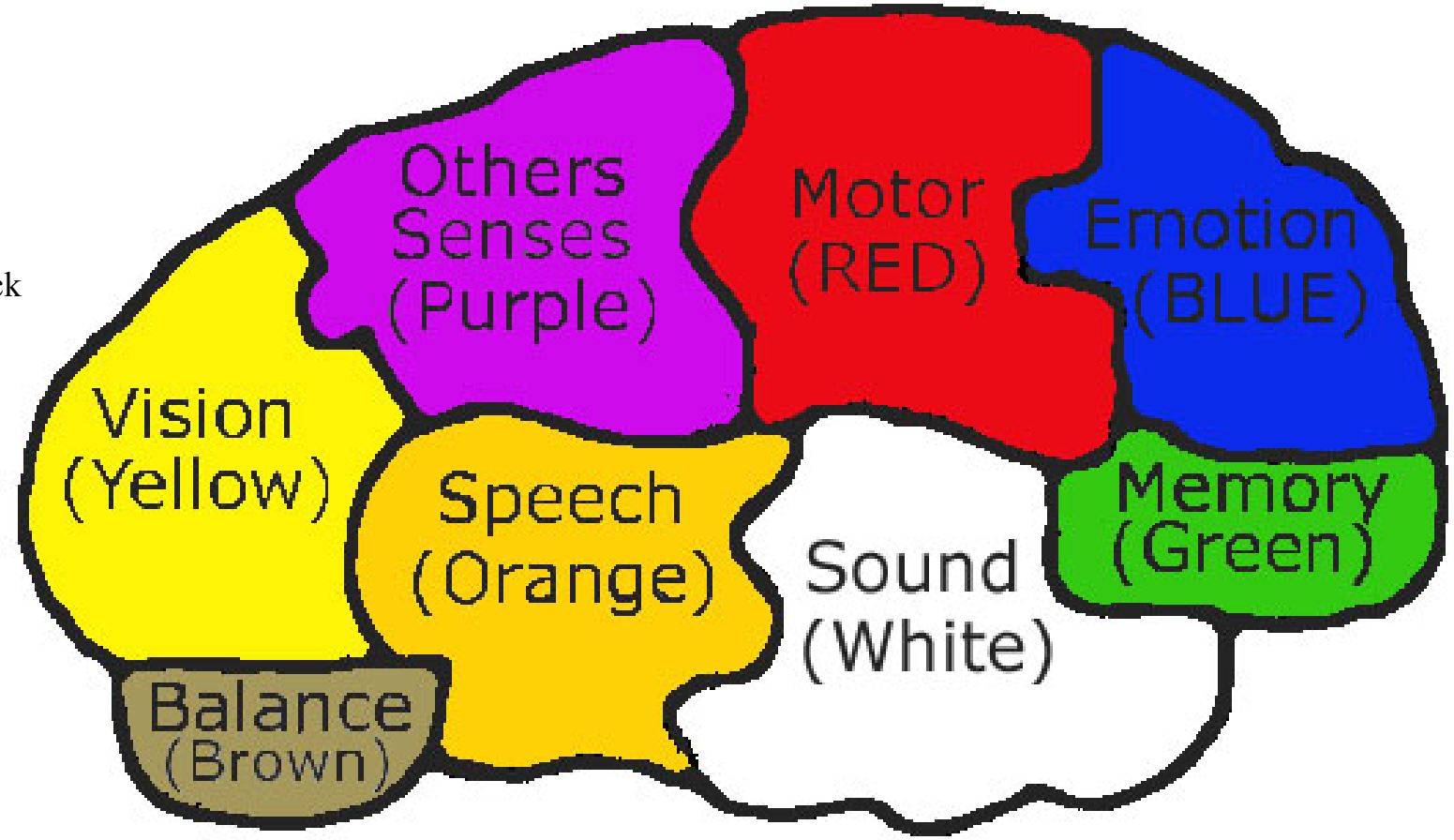
Brain Bruising



From: http:www.newscientispace.com/data/images/ns/cms/dn3578/dn3578-1_535.jpg

The Brain

Back



Front

A Modern Football Helmet

Sources: NASA

When Should I Replace My Helmet?

Ask yourself these questions:

- **Did you crash it?**
- **Did you drop it hard enough to crack the foam?**
- **Is it from the 1970's?**
- **Is the outside just foam or cloth instead of plastic?**
- **Does it lack a CPSC, ASTM or Snell sticker?**
- **Can you not adjust it to fit correctly?**
- **Do you hate it?**

If you answered yes to any of the these questions-

REPLACE IT!!!