Dangerous, therefore, is it to take shelter under a tree, during a thunder-gust. It has been fatal to many, both men and beasts.

Benjamin Franklin

Arizona State University
SES 194

Energy in Everyday Life

Mythbusters II

Frank Timmes

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What is the stuff that flows through a light bulb and comes back out again through the other wire?

Electric charge is the “stuff" that flows through lightbulbs, and flows around a circuit.

No charge is lost during the operation of a circuit, and no charge is gained.

Charge flows very slowly, and can even stop flowing and just sit there inside the wires. In an AC circuit, charge does not flow at all, instead it sits in one place and wiggles forwards and back.

What is the stuff that flows into a light bulb and gets changed entirely into light and heat?

Electromagnetic energy.

This“stuff” can flow from place to place. It always flows very fast; almost at the speed of light.

It can be gained and lost from circuits, such as when a battery’s energy is converted by the light bulb into a flow of light and heat.

Electric Charge	Electomagnetic Energy
Flows very slowly, can stop	Flows at the speed of light
Flow is a current", in Amps	Flow is electric power, in Watts
Flows through light bulbs	Consumed by light bulbs
In AC, wiggles back and forth	In AC, flows continuously
Supplied by metals	Supplied by generators, batteries
Doesn't leave circuit	Source injects, load removes
Composed of charges from atoms	Composed of electric and magnetic fields
Electrons and protons	Photons
Flows inside wires	Flows outside wires
Generators pump it through	Generators create it
Visible - shiny part of metal	Invisible to human eye
Measured in coulombs	Measured in joules
Occurs naturally	Produced and sold by energy companies
What scientists call "electricity"	What energy companies call "electricity"

But the electric company says that they're selling electricity.

They're using the unscientific definition of the word electricity, changing charge to mean energy.

They don't sell any electricity. They sell a pumping service. They are pumping charges back and forth inside the wires.

That what AC means. The electricity (charge) just sits in the wires and wiggles 60 times per second.

The electric company sells a pumping service, and you can use their service to run motors and heaters and light bulbs.

They sell energy, and then send that energy to you by pumping some long columns of electrons, but they don't sell you any of the electrons.

Benjamin Franklin’s kite was struck by lightning.
Beep!

Many people believe that Ben Franklin's kite was hit by a lightning bolt, and think that this was how he proved that lightning was electrical. This is wrong.

When lightning strikes a kite, the spreading electric currents in the ground can kill anyone standing nearby, to say nothing of the person holding the string!

So what did Franklin actually do? He showed that a kite could collect a tiny bit of electric charge out of the sky during a thunderstorm.

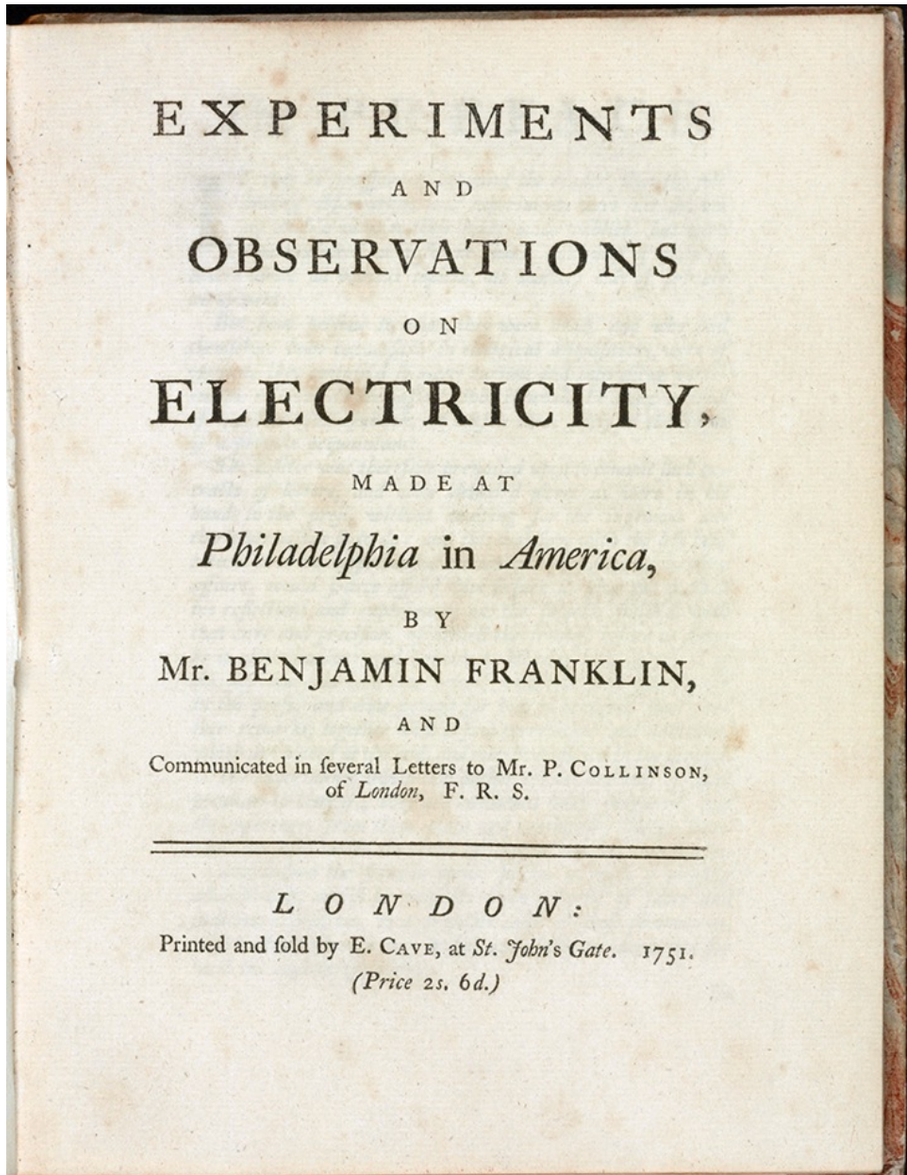
Electric leakage through the air caused his kite and string to become charged, so the hairs on the twine stood outwards.

Twine is slightly conductive, so the imbalanced charge spread to all parts of the kite string.

Franklin used the twine to electrify a metal key, and tiny sparks could then be drawn from the key.

He used a metal object because sparks cannot be directly drawn from the twine, it's not conductive enough.

This suggested that some storm clouds carry a strong electrical charge. It implied that lightning was just a large electric spark.



EXPERIMENTS

AND

OBSERVATIONS

ON

ELECTRICITY,

MADE AT

Philadelphia in *America*,

BY

Mr. BENJAMIN FRANKLIN,

AND

Communicated in ſeveral Letters to Mr. P. COLLINSON, of *London*, F. R. S.

LONDON:

Printed and ſold by E. CAVE, at *St. John's Gate.* 1751.

(Price 2s. 6d.)

The common belief that Franklin easily survived a lightning strike is not just wrong, it is dangerous: it may convince kids that it's OK to duplicate the kite experiment as long as they “protect” themselves by holding a silk ribbon.

Make no mistake, Franklin's experiment was extremely dangerous, and if lightning had actually hit his kite, he certainly would have been killed.