Electrostatic Mixed-Up Tapes: Part 1

Have you ever taken laundry out of the dryer in the winter time? Did you find nylon or wool socks stuck to sheets, clothes, or even your arm? Think about how wool or nylon socks stick to other clothes, or even to your arm, when you take the laundry out of the dryer in the winter time. Socks are not magnets, and they are not made of magnetic materials. So how can they act like magnets and attract other items? In this activity, you will use pieces of sticky tape to understand how electric charges work to attract or repel.

Note: this activity will not work in humid environments. If it is a humid day, you will want to do this somewhere with air conditioning where the humidity is low.

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Name(s):	

Part I: Stuck On You?

You will need:

- ○ A tape dispenser containing a roll of clear, sticky tape
- ○ A smooth surface like a craft table or a counter, cleaned and dried
- ○ Optional: something metal, like a lamp frame, refrigerator, key, table leg, etc.

Make a Prediction!

How do you think that non-magnetic things like wool socks can attract other on-magnetic objects like your arm?
I think that non-magnetic things like wool socks can attract other on-magnetic objects like my arm by...

Directions:

Quickly pull off a piece of tape about 6 inches long. Hold the piece of tape in the air. Your fingers should be at the top of the tape so that it is hanging down and not touching anything else.

What do you think will happen if you bring the tape close to your other hand?
I think...

Try it. What happened?

I noticed that...

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1. Rub the smooth side of the tape a few times against something metal. If you do not have something metal nearby, you can also slide the tape several times between your fingers. Do this gently so that you are touching both sides of the tape but the tape doesn't get stuck to you.

What do you think will happen now if you bring the tape close to your hand?
I think...

Try it. What happened?

I noticed that...

1. Fold under about ½", sticky sides together, on one end of the tape. You should now have a "tab" on one end that won't stick to anything else. The tab will make it easier to peel the tape off surfaces.
2. Next, stick the tape to the table. Press it down to make sure it is smooth and there are no bumps or wrinkles.
3. Then use the tab to quickly pull the tape up and off the table.

What do you think will happen now if you bring the tape close to your hand?
I think...

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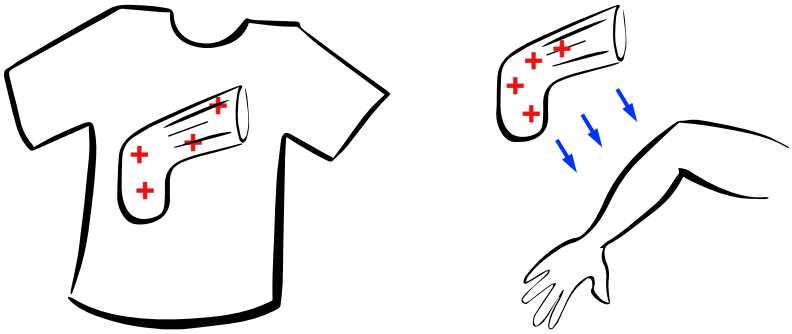
Try it. What happened?

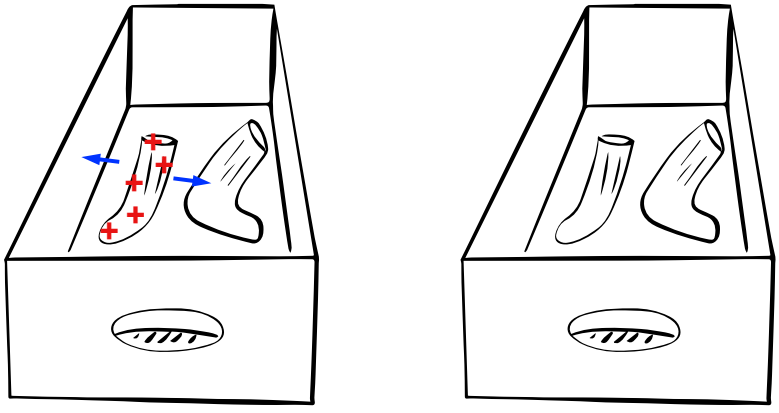
I noticed that...

What's Going On Here?

Have you ever taken laundry out of the dryer in the winter time and noticed nylon or wool socks stuck to a shirt? If you peel the socks off, you might even notice that they move towards your arm instead of just hanging straight down. All of this happens because of **static electricity** (sta-tick ee-leck-triss-ih-tee). Your socks gained a positive **electrostatic charge** (ee-leck-troh-sta-tick charj) when they rubbed against other things inside of the dryer.



In physics, the word "charge" is used to describe whether and how something can attract other things. A charge can be positive (+1) or negative (-1). When something gains either a positive or a negative electrostatic charge, it is called a **charged object** (charjd ahb-jekt). A charged object can attract an uncharged object (0),so the charged socks move towards your uncharged, or **neutral** (nyoo-trill), arm When you take socks out of your drawer, however, they do not stick to your other items of clothing. At some point, a **static discharge** (dis-charj) must have happened. During static discharge, a charged object releases its charge and returns to a neutral state. In your drawer, your socks released their charge and went back to being uncharged objects.



Charge **No Charge**

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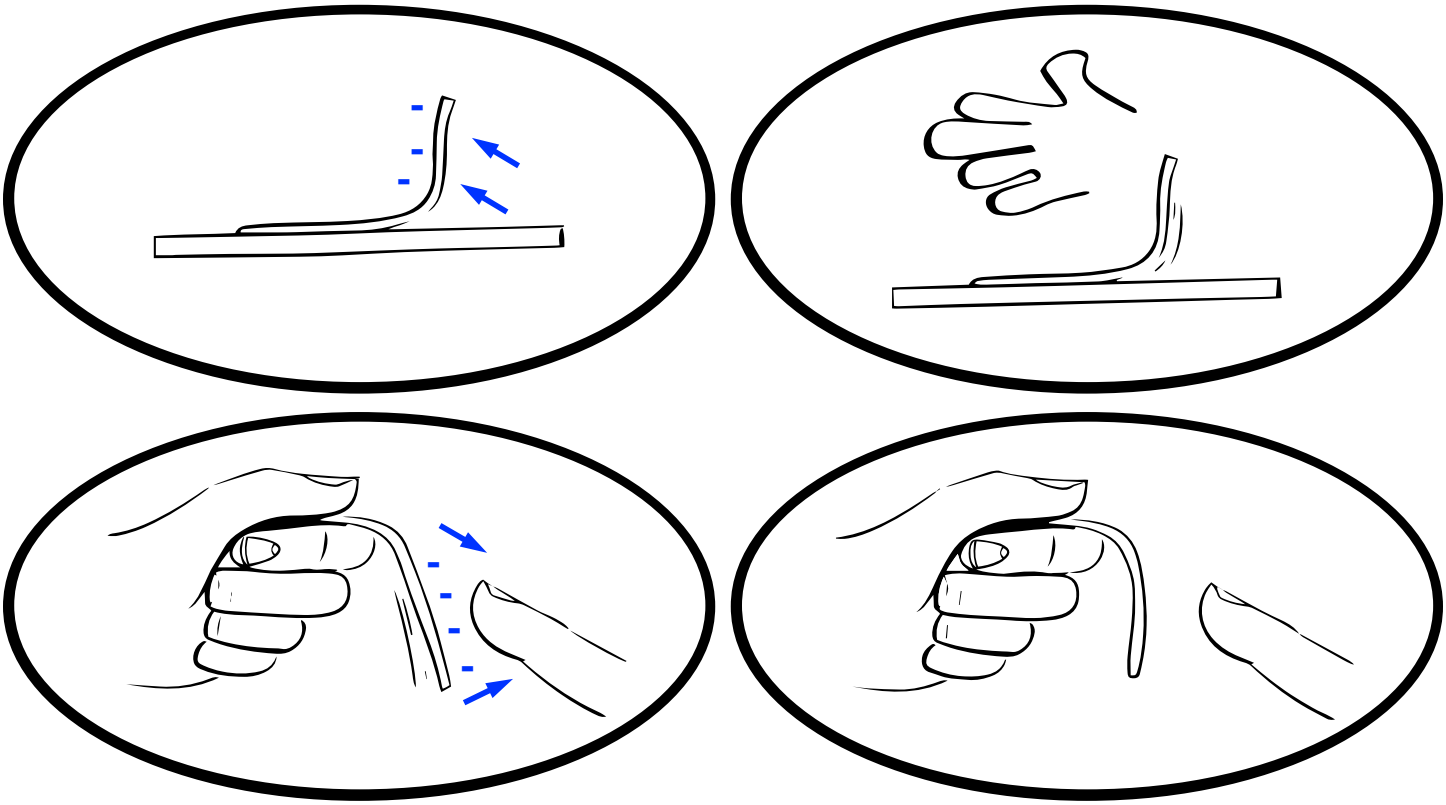
Like your socks, tape can gain an electrostatic charge. When you pull sticky tape quickly off of a surface, it gains a negative electrostatic charge to become a charged object. The tape now is attracted to uncharged objects, like your hand. When you rub the charged tape against something metal or slide it gently between your fingers, you cause a static discharge to happen. The tape releases its charge, and then it goes back to a **neutral** (noo-trill), uncharged state. Without a charge, it cannot attract your hand.



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