OK, let's do a why this matters.

Let's do a why this matters.

Why does this matter?

Well, because, see, these guys were trying to figure out what was inside of an atom.

But other people, like John Baird, said, well, wait a second.

You just gave me a paintbrush.

You gave me a paintbrush.

Look at this.

That's a paintbrush, painting with a magnet.

It really is.

And the screen would light up over here.

And so he said, well, I can paint.

I can paint pictures.

And this really is the first television screen.

This was the first TV screen, and all they needed to do, there-- OK, right?

There it is.

Look!

That's a cathode ray tube.

Maybe that's one of Thomson's students who won a Nobel Prize.

And but now, you put this down, and you put these sort of things around it.

What are those things?

Magnetic fields, that's all it is.

It's just magnetic fields.

It's Thomson's experiments, right?

But now they're using it to zip the beam around faster than you're [INAUDIBLE] keep up with so that it looks like a picture.

Now, electron painting had never been done before, because we didn't know that we had these electrons.

But as soon as we knew, boy, did that launch a completely new era of screens.

Right?

The era of screens.

We don't use cathode ray tubes.

I was going to say, ask your grandparents.

They'll tell you about the cathode ray tube TVs, which they all had.

But you know, we don't use cathode ray tubes to paint with electrons today in that way, but we still paint with electrons today.

Right?

Youre OLED screen is still simply an electron-based painting tool, right?

OK, we're just pumping the electrons into the phosphor in a different way, and we'll be talking about that as we go through the rest of this week and we understand how electrons interact with light coming in and out of an atom.

OK, so that's my why this matters.

And by the way, a side note here is that when TVs first came along, green was pretty easy.

There were a lot of chemistries that were used for this screen.

You put a different chemistry here, and it lights up differently when electrons hit it.

Why?

Wait until Wednesday.

Green was easy.

Yellow was easy.

Red was hard.

Red was hard.

They couldn't get a good red.

And of course, that's essentially the reason there were no color TVs until the '60s, right?

And the answer, of course, was here.

The answer was that there was a phosphor that worked, but it was yttrium orthovanadate with a little bit of europium added to it.

Just a little bit of europium.

Why did that work?

Again, we need to understand how electrons interact with matter, which is where we're going.

And speaking of yttrium, speaking of yttrium, this is also a side story, but it's kind of worth noting.

You know, elements are named often-- well, elements can be named after many things, right?

In this case, it was named after Ytterby, Sweden.

Ytterby, Sweden, is a pretty cool place.

They had this one cave.

You got to go to it.

It's really cool, because four elements of the periodic table were all discovered from Ytterby, Sweden, in this one cave.

Four!

And I keep thinking, where is that cave in Cambridge?

[LAUGHTER]

Hm?

They cannot discover any more elements, because there's no other way to mess with the name Ytterby.

[LAUGHTER]

That's pretty cool.

That's pretty cool.

That's a cool cave.

That's worth visiting.