

Smithsonian

Making Movies in Technicolor



Lisa Holewa

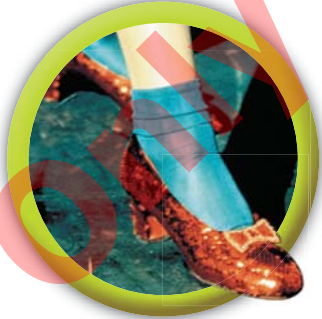
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Follow the Yellow Brick Road

Have you heard of the yellow brick road? What about Dorothy's ruby slippers? You might recognize them from the movie *The Wizard of Oz*. But why do people still connect them to a film that came out more than 75 years ago?

One answer is the colors. The red slippers and yellow brick road are memorable because they were so **vibrant**. The same can be said for the film's sparkling Emerald City and the bright-green Wicked Witch of the West.



The Story of Oz

The Wizard of Oz film is based on a children's book written by L. Frank Baum. It tells the story of a girl named Dorothy. She lives on a farm in Kansas with her aunt and uncle. When a tornado hits, she and her dog, Toto, are carried away to the Land of Oz.

The Wonderful Wizard of Oz book was first published in 1900. It quickly became a best seller. Within two years, it was made into a play. The play was made into a short film in 1910. It was then made into a full-length movie in 1925.





The Wizard of Oz
1925 film poster

The 1925 film version of *The Wizard of Oz* does not include Dorothy's dog, Toto. There is also no Wicked Witch and no yellow brick road!



Back then, movies did not have sound. Those movies are called silent films. They were usually shown while live musicians played in the theaters. Music helped set the mood of the movies. Stories were told mostly through actors' actions and facial expressions. Black screens with text and dialogue also helped explain stories. By the early 1930s, movies with sound (called talkies) took over.

In 1939, the Oz movie most people today know and love was made. This version starred Judy Garland. Not only did it have sound, but it also showed the scenes of Oz in full color.

From Black and White to Technicolor

Today, anyone can film full-color videos using a smartphone. But when movies first came out, they were all black and white. The ability to **transfer** color to film didn't exist yet. That changed thanks to a process called Technicolor.

The Wizard of Oz was not the first movie to use color. When it came out, it wasn't a major hit. But it used color in a way that makes it hard to imagine the film without it. Without a doubt, color made the movie better.



three-strip Technicolor movie camera

In the children's book *The Wonderful Wizard of Oz*, Dorothy's slippers are not red. They are sparkly silver!



Judy Garland as
Dorothy Gale



Creating Technicolor

The process used for *The Wizard of Oz* is called Technicolor. Herbert Kalmus, Daniel Frost Comstock, and W. Burton Wescott created the first Technicolor process in 1915. It made movies colorful. But the process did not really film the movies in color. That would not be possible for several more **decades**. Instead, it used special cameras to record films through **filters**.

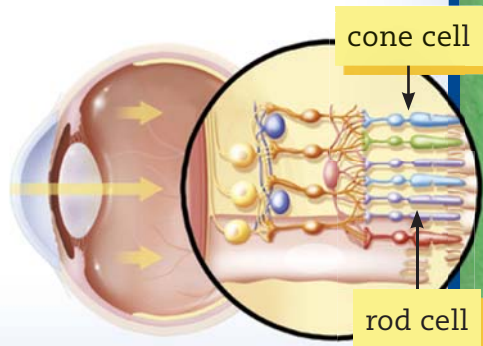


This frame of film used the first Technicolor process.

SCIENCE

How Do Eyes Perceive Color?

Eyes and brains work together to see color. Light moves in long and short waves. When light hits an object, the waves bounce off and hit parts of the eye called rod cells and cone cells. These rods and cones react to the different light waves and send messages to the brain. The brain decodes these messages as color.



From Two Filters to Three

In Technicolor's first process, light passed through the lens of a camera and into a prism. In the middle of the prism was a mirror that split the light in two directions. Each camera had two colored filters. One was red and the other green. The film frames were shown together, creating color images.

But there were problems. The movies had to be played through a special projector. It was hard to match the pictures perfectly. And certain colors didn't work. Green and red could not be mixed to create good blues or bright yellows. Skies sometimes looked green. Purple could come out looking black or brown. This made Technicolor hard for filmmakers to use and hard for film watchers to enjoy.



This frame of film used the second Technicolor process.

STEAM CHALLENGE

Define the Problem

Pretend you are on the audio-visual crew for your school's big play. During dress rehearsal, you notice that the color changer on your spotlight is broken and is only producing white light. You need to be able to produce different-colored lights for the night's performance. Your task is to create a filter that can show light in red, orange, yellow, green, blue, and purple.



Constraints: Your filter must be made from items that are commonly found within a school or can be purchased at a common store.



Criteria: Your filters must be able to switch between colors quickly. The more colors you can create, the better.





Research and Brainstorm

What colors can be created by mixing primary colors? What materials will let light pass through (i.e., are transparent)? How do people see color?



Design and Build

Make a plan of how to create each color and what materials will be used. Gather and assemble materials. Make your filter(s).



Test and Improve

Use a flashlight with your filter to see which colors can be created. What range of colors can you make? Can you adjust the shades of the colors? Modify your design and try again.



Reflect and Share

Were there any colors you could not create? Why couldn't you create them? If you had more time, could you create a different solution? Would it be a better idea? Why or why not?

