Movies are Magic: Crash Course Film History #1

Crash Course: Film History
https://youtube.com/watch?v=vsnB4iBb78o
https://nerdfighteria.info/v/vsnB4iBb78o

Craig: Hello there. How would you like a ticket to one of the most influential forms of mass communication the world has ever known? It's a universal language that lets us tell stories about our collective hopes and fears, to make sense of the world around us, and the people around us. I'm talking about film. You probably figured that out because of the title of this video, but yeah. Talking about film. This powerful medium sits in a sweet spot of human culture; at the intersection of art, industry, technology, and politics. It's inescapable, like FBI piracy warnings and trailers that give away the entire movie. I'm looking at you, Batman vs. Superman. And also versus Wonder Woman apparently, cause I learned that from the trailer. But before we get to a mouse named Mickey, a little tramp, or whether or not Han shot first, we have to go all the way back to the beginning... In a galaxy far, far... Well, right here.

We have to go all the way back to the beginning because the creation of this cornerstone of modern entertainment was basically an accident. We owe it all to the inventors and artists who were experimenting with new technologies and trying to capture snippets of reality, to see the world in a whole new way. I'm Craig Benzine and this is Crash Course: Film History. Ready? Lights! Camera! Action! Roll the intro now. We should roll the intro, I think.

intro music plays

The term "film" was first used to describe a specific technology - a thin, flexible material coated in light-sensitive emulsion that retains an image after it's exposed to light. It's also the end product of that photo-chemical process. A film is a movie, but it's also a verb to describe the process of capturing moving pictures, as in "I'm going to film a movie today." or "Nick is filming me right this very second." or "I'm gonna film a film on film!" Over time, the original film technology has switched to analog and digital substitutes. First, things like VHS or BETA, and eventually digital video, like when you record something on your phone.

Now, at the very beginning of its history, before all these innovations existed, film started out as a collection of still images viewed one after another in rapid succession, which creates the illusion of motion. Like what you're seeing right now. It was a magic trick, and from that trick came an art form that's a blend of literature, drama, photography, and music.

So, how does this illusion actually work? It all comes down to a couple quirks of human perception. Tricks your eyes play on your brain or your brain plays on your eyes or maybe both.

The nineteenth-century British scholar Peter Mark Roget was the first to describe one of these tricks, called "persistence of vision." Basically, this is the phenomenon that keeps you from seeing the black spaces between the frames of a projected film. Now, frame can mean a lot of things in film language, but in this case, it's what we call one of the still images that make up a movie. It turns out that if a frame flashes in front of your eyes, your brain retains that image for about a fifth of a second after it's gone. If another frame appears within that fifth of a second, your brain won't register the black space between them. You'll just perceive the next image. So when a frame flashes twenty-four frames per second in front of your eyes, your brain doesn't interpret it as twenty-four images separated by flashes of black. Instead, it looks like a constant picture. This effect can be combined with another oddity of perception called the "Phi Phenomenon," defined in 1912 by the Czech-born psychologist, Max Wertheimer. Incidentally, oddity of perception? My nickname in high school.

The Phi Phenomenon is an optical illusion that lets you see a series of images in rapid succession as continuous motion. Think of those flip books you played with as a kid. Take a series of still pictures, shot or drawn in sequence, flip them quickly before your eyes, and voilà! The illusion of motion. You have yourself a motion picture, or, a moving picture. In other words, a moving pictury. Better yet, a movie. Write that down, that's what we're going with.

Now, people have been telling stories since we've had language, and they've been using pictures, even animating them, for almost as long. One line of thinking traces movies all the way back to cave paintings in places like Chauvet, France or El Castillo, Spain. You know, those images of animals, trees, and human figures painted on stone walls as far back as 32,000 years ago. Scientists think the original artists might have used flickering torchlight to make them appear to move.

Fast forward to just 5,000 years ago, and we find people inventing more sophisticated devices to create that same illusion of motion. Among these pre-film animation tools, the ones we're most familiar with are called "zoetropes". These are like a bowl or a deep cylinder with sequential images painted on the inside, and small slits or windows cut into the edges. Spin the bowl and peer through the slits, and thanks to persistence of vision and the Phi Phenomenon, the pictures seem to move. Oooh... Over the centuries, these devices came in lots of different forms and just as many names: phenakistoscopes, stroboscopes, stereoscopes... all kinds of scopes, but not Scope, the mouthwash. That's something else.

And for a long, long time, this is as close as we ever got to film until photography came along. Now it's important to remember that no one set out to invent movies, there was no one mastermind and no grand plan to revolutionize communication or art on a global scale. If I was around, it would have been me, but there wasn't anyone. Instead, film as we know it today exists, because of a series of happy accidents, technical innovations, and scientific byproducts. Cause, really, at the beginning, nobody knew what they were doing, just like now! I'm looking at you, Batman vs. Superman. Photography came about in the early-to-mid-19th century, at a time of great scientific and artistic innovation. People of means all over the world were tinkering in their spare time, playing around with technology and seeing what they could create, combine, augment, or transform.

Before the photograph was invented, people were isolating images of the world around them with devices like the "camera obscura". From the Latin meaning "dark chamber", a camera obscura is essentially a box, tent, or room with a lens or pinhole in one end, and a reflective surface like a mirror at the other. Light travels through the hole and displays an inverted image on the mirror. Like most of these pre-photography technologies, the camera obscura was mostly a novelty, a toy, or sometimes a tool that let artists create images to study or trace. As the 19th century dawned, folks started playing around with photosensitive chemicals, to figure out the properties while trying not to melt themselves with acid, which we should all try to do, in practice.

In the 1820s, a French inventor named Joseph Nicéphore Nièpce took the first known camera photograph, he called it "view from the window at Le Gras". Nièpce used a camera obscura to project an image onto a pewter plate coated in a light-sensitive chemical. The areas of the chemical that were hit with the brightest light hardened, but the areas touched by weaker light could be washed away, so a crude permanent record of the original image survived. Scientists now believe it took a couple days of exposing the plate to light for the image to finally show up, so we're still a long way from movies, but we're getting closer, get excited.

Louis Daguerre, another Frenchman and a close buddy of Nièpce, was able to shorten the exposure time to just a couple of minutes. His daguerreotype process became the first commercially available mass-market means of taking photographs in 1839, and this is

usually considered to be photography's birthday. Hurray!!! Happy birthday... But hold on, the daguerreotype still had a few problems to work out: the photographs were pretty fragile, they weren't easy to replicate, and the chemicals were, shall we say, toxic.

Along came George Eastman, an American entrepreneur and founder of Eastman Kodak, who invented a way of taking pictures on paper rather than metal or glass plates. This method also didn't need as many chemicals which probably saved a lot of Snap Happy inventors from health problems. Now photography was off to the races, literally. So let's go to the Thought Bubble, and see how photographs were used to pause time and take a closer look at movement. Take it away, Thought Bubble!

[Thought Bubble]

Well, I will take... I'm going to narrate, so... In 1872, Leland Stanford, the former governor of California and horse race aficionado, made a bet with another big wig, that a horse at full gallop raises all four hooves off the ground at some point. To settle the bet, Stanford commissioned a photographer and inventor named Eadweard Muybridge to find photographic proof. So Muybridge set up 12 cameras along a racetrack, each triggered by a trip wire to capture a still image of a horse in motion. His set of 12 photos was something brand new. Rapid motion broken down into frozen, study-able moments. Spoiler alert! Governor Stanford won his bet, there were a couple images where that horse wasn't touching the ground at all. Muybridge's experiment launched a wave of motion studies, as photographers and inventors all over the world began using these new technologies to break down continuous motion into individual images, and that was one giant step closer to motion pictures. Thanks, Thought Bubble! You're so great.

One of the photographers was yet another Frenchman, a man named Etienne-Jules Marey, whose training in physiology led him to capture motion studies of birds in flight and human athletes in action. Instead of trip wires like Muybridge, Marais invented what he called "the corona photographic gun", awesome! And switched from sheets of photographic paper to rolls allowing him to take bursts of photographs, 12 per second. Even with all these increasingly fancy techniques, it's important to note that these were still just series of photographs. Motion studies were sometimes projected using devices like Muybridge's zoopraxiscope, but nobody was trying to make movies yet. So, the world was boring.

Each of these innovations set up a fellow you may have heard of, Thomas Edison, and a scientist who worked for him named W.K.L Dickson, to invent the "kinetograph", the world's first motion picture film camera. And they, in turn, paved the way for the first filmmakers to experiment with motion picture technologies and storytelling.

We mentioned earlier that film is an illusion, but it's an illusion that's carefully crafted by people who want to show a specific point of view. With aesthetic choices from shot angle and shot size, to lens type and lighting style and how much hair you put on a Wookie, filmmakers can further affect how we as an audience interpret reality. In a real sense, film wasn't invented, it was stumbled upon. A series of happy accidents eventually led us to Citizen Kane, Grand Illusion, Black Girl, and the experimental works of Stan Brakhage, not to mention things like The Wizard of Oz, Raiders of the Lost Ark, Captain America: Civil War, and Sharknado. There's a whole world of film out there to discover, and there's a lot that film can help you discover about yourself, too, and that's the story will continue next time we need.

Today we talked about how film is a sort of magic trick, thanks to the ways our eyes and brains work; thank you eyes and brains! We introduced the very very beginning of the film, when people started using sequential images to tell stories. We discussed photography as a huge technological leap forward since chemicals and light to capture images and break down fast-moving reality like never before. Next time, we'll learn about the very first motion picture cameras and the start of movies as we know them now. Crash Course Film History is produced in association with PBS Digital Studios. You can head on over to their channel to check out a playlist of their latest amazing shows like Barbecue with Franklin, PBS Off-book and Indie Alaska. This episode of Crash Course is filmed in the Dr. Cheryl C. Kinney Crash Course Studio with the help of these nice phenakistoscopes and our amazing graphics team is Thought Café.