

MEDP 150 Animation Lecture

5,200 year old bowl found in Iran that has five images painted around it showing poses of a goat leaping up to nip at a tree.

An Egyptian mural approximately 4000 years old found in a tomb features a sequence of poses that depict a wrestling match.

Both of these ancient artifacts present the desire for artists and cultures to represent movement through static images. The desire to animate has always been present, missing was the technology to bring drawings to life.

Magic Lantern (c 1650) an oil lamp and a lens, made possible the projection of images painted on glass plates.

Animation is the rapid display of a sequence of images of 2-D or 3-D artwork or model positions in order to create an illusion of movement. It is an optical illusion of motion due to the phenomenon of persistence of vision, and can be created and demonstrated in a number of ways.

Persistence of vision is the phenomenon of the eye by which an afterimage is thought to persist for approximately one twenty-fifth of a second on the retina, supposedly to compensate for the blackout that would be experienced otherwise through blinking. The theory was invoked to explain how the perception of apparent motion in film created the illusion of moving pictures.

A **thaumatrope** (1824) is a toy that was popular in Victorian times (mid 19th Century). A disk or card with a picture on each side is attached to two pieces of string. When the strings are twirled quickly between the fingers the two pictures appear to combine into a single image due to persistence of vision.

A **zoetrope** (1834) is a device that produces an illusion of action from a rapid succession of static pictures. The term zoetrope is from the Greek words zoe, "life" and trope, "turn". It may be taken to mean "wheel of life" or "living wheel".

It consists of a cylinder with slits cut vertically in the sides. Beneath the slits on the inner surface of the cylinder is a band which has either individual frames from a video/film or images from a set of sequenced drawings or photographs. As the cylinder spins the user looks through the slits at the pictures on the opposite side of the cylinder's interior. The scanning of the slits keeps the pictures from simply blurring together so that the user sees a rapid succession of images producing the illusion of motion, the equivalent of a motion picture. Cylindrical zoetropes have the property of causing the images to appear thinner than their actual sizes when viewed in motion through the slits.

Étienne-Jules Marey (March 5, 1830 – May 21, 1904) was a French scientist and chronophotographer, born in Beaune, France.

His work was significant in the development of cardiology, physical instrumentation, aviation, cinematography and the science of labor photography. He is widely considered to be a pioneer of photography and an influential pioneer of the history of cinema.

Flying pelican captured by Marey around 1882. He found a way to record several phases of movements in one photo

He started by studying how blood moves in the body. Then he shifted to analyzing heart beats, respiration, muscles (myography), and movement of the body. To aid his studies he developed many instruments for precise measurements. For example, he was successful in selling an instrument called Sphygmographe to measure the pulse. In 1869 Marey constructed a very delicate artificial insect to show how an insect flies and to demonstrate the figure-8 shape it produced during movement of its wings. Then he became fascinated by movements of air and started to study bigger flying animals, like birds. He adopted and further developed animated photography into a separate field of chronophotography in the 1880s. His revolutionary idea was to record several phases of movement on one photographic surface. In 1890 he published a substantial volume entitled *Le Vol des Oiseaux* ("The Flight of Birds"), richly illustrated with photographs, drawings, and diagrams. He also created stunningly precise sculptures of various flying birds.

Marey's chronophotographic gun was made in 1882, this instrument was capable of taking 12 consecutive frames a second, and the most interesting fact is that all the frames were recorded on the same picture, using these pictures he studied horses, birds, dogs, sheep, donkeys, elephants, fish, microscopic creatures, molluscs, insects, reptiles, etc. Some call it Marey's "animated zoo". Marey also conducted the famous study about cats landing always on their feet. He conducted very similar studies with a chicken and a dog and found that they could do almost the same. Marey also studied human locomotion. He published another book *Le Mouvement* in 1894.

Eadweard J. Muybridge (April 9, 1830 – May 8, 1904) was an English photographer, known primarily for his important pioneering work, with use of multiple cameras to capture motion, and his zoopraxiscope, a device for projecting motion pictures that pre-dated the celluloid film strip that is still used today."

In 1872, former Governor of California Leland Stanford, a businessman and race-horse owner, had taken a position on a popularly-debated question of the day: whether all four of a horse's hooves left the ground at the same time during a gallop. Stanford sided with this assertion, called "unsupported transit", and took it upon himself to prove it scientifically. (Though legend also includes a wager of up to \$25,000, there is no evidence of this.) Stanford sought out Muybridge and hired him to settle the question.[2] Muybridge's relationship with Stanford was long and fraught, heralding both his entrance and exit from the history books.

To prove Stanford's claim, Muybridge developed a scheme for instantaneous motion picture capture. Muybridge's technology involved chemical formulas for photographic processing and an electrical trigger created by the chief engineer for the Southern Pacific Railroad, John D. Isaacs.

Muybridge sequence of a horse jumping.

In 1877, Muybridge settled Stanford's question with a single photographic negative showing Stanford's racehorse Occident airborne in the midst of a gallop. This negative was lost, but it survives through woodcuts made at the time.

By 1878, spurred on by Stanford to expand the experiment, Muybridge had successfully photographed a horse in fast motion using a series of twenty-four cameras. The first experience successfully took place on June 11 with the press present. Muybridge used a series of 12 stereoscopic cameras, 21 inches apart to cover the 20 feet taken by one horse stride, taking pictures at one thousandth of a second. The cameras were arranged parallel to the track, with trip-wires attached to each camera shutter triggered by the horse's hooves.

Recent scholarship has pointed to the influence of Étienne Jules de Marey on Muybridge's later work. Muybridge visited Marey's studio in France and saw Marey's stop-motion studies before returning to the U.S. to further his own work in the same area. However, whereas Marey's scientific achievements in the realms of cardiology and aerodynamics (as well as pioneering work in photography and chronophotography) are indisputable, Muybridge's efforts were to some degree artistic rather than scientific.

Richard Outcault's Hogan's Alley debuted in 1895 in Joseph Pulitzer's New York World newspaper and is popularly considered the first modern comic due to the sequencing of panels and use of word balloons, and was originally formatted as a large single-panel illustration with text throughout. The slum setting and main character, whose head, shaved to prevent lice, and hand-me-down yellow nightshirt point to his poverty, allowed Outcault to humorously call attention to social issues of his day, such as class inequality, racial tension, and America's burgeoning consumerist culture.
<http://comicsalliance.com/tribute-richard-outcault/?trackback=tsmclip>

J. Stuart Blackton, Enchanted Drawing, 1900

The first animated sequences on film.

"The Haunted Hotel", a 1907 film released by Vitagraph and directed by **J. Stuart Blackton** incorporated stop motion animation as furniture and various elements of the hotel come alive. It premiered in Paris in April 1907 and immediately there was a demand for more films using its incredible object animation techniques.

At this time, **Émile Cohl** (January 4, 1857 – January 20, 1938) cartoonist, and animator, called "The Father of the Animated Cartoon" worked for the French film studio Gaumont. Studio director Léon Gaumont "ordered his staff to figure out the "mystery of 'The Haunted Hotel'." Cohl studied the film frame by frame, and in this way discovered the techniques of animation."

Cohl made **Fantasmagorie** from February to May or June 1908. This is considered the first fully animated film ever made. It was made up of 700 drawings, each of which was double-exposed, leading to a running time of almost two minutes in a "stream of consciousness" style. The title is a reference to the "fantasmograph", a mid-Nineteenth Century variant of the magic lantern that projected ghostly images that floated across the walls.

Little Nemo In Slumberland

by Winsor McCay, newspaper comic strip from 1905 to 1914. Each strip represented surreal fantasies of a little boy traveling to other worlds in his sleep.

Gertie the Dinosaur is a 1914 animated short film by American cartoonist and animator Winsor McCay. McCay first used the film before live audiences as an interactive part of his vaudeville act; the frisky, childlike Gertie did tricks at the command of her master. Gertie was the first film to use animation techniques such as keyframes, registration marks, tracing paper, the Mutoscope action viewer, and animation loops.

The Rotoscope was a device invented by **Max Fleischer** that helps to produce realistic animation. Live action film is played frame-by-frame on the underside of a piece of glass. On the topside of the glass is an animator traces that frame of film. The tracing is then incorporated into an animation.

Out of the Inkwell, animated series produced by Max Fleischer, 1918-1929. Koko the clown is rotoscoped based on Dave Feischer, Max's brother who worked as a clown in Coney Island.

Steamboat Willie, 1928 by Walt Disney was the first cartoon with a soundtrack, featuring voices and sound effects printed on the animation's film.

Story Department & Story Boarding - Story Development

Disney had realized that the success of animated films depended upon telling emotionally gripping stories; he developed an innovation called a "story department" where storyboard artists separate from the animators would focus on story development alone, which proved its worth when the Disney studio released in 1933 the first-ever animated short to feature well-developed characters, *Three Little Pigs*.

https://en.wikipedia.org/wiki/History_of_animation

Walt Disney drew directly from fairy tales and the archetypes presented in long standing fairy tales to produce Disney classics such as ***Snow White and the Seven Dwarfs***, 1937, the first full-length cel animated feature film from the United States. Russian folklorist deconstructs and puts forth these archetypes in a 1928 book.

Vladimir Propp (1895-1970) published ***Morphology of the Folktale*** in 1928. In this book, Propp deconstructs 100 Russian fairy tales. He presents 31 functions that create the tale after the initial situation such as Absentation, Guidance, Struggle, Victory, Wedding...

He also identifies 7 broad character archetypes:

1. The villain — an evil character that creates struggles for the hero.
2. The dispatcher — any character who illustrates the need for the hero's quest and sends the hero off. This often overlaps with the princess's father.
3. The helper — a typically magical entity that comes to help the hero in their quest.
4. The princess and often her father — the hero earns her love but is unable to marry her as a consequence of some evil or injustice, perhaps the work of the villain. The hero's journey is often ended when he marries the princess, which constitutes the villain's defeat.
5. The donor — a character that prepares the hero or gives the hero some magical object, sometimes after testing them.

6. The hero — the character who reacts to the dispatcher and donor characters, thwarts the villain, resolves any lacking or wrongdoings and weds the princess.

7. The false hero — an impostor figure who takes credit for the hero's actions or tries to marry the princess.

<http://changingminds.org/disciplines/storytelling/plots/propp/propp.htm>

Snow White may have been the first feature U.S. feature length animation, however, historically the first surviving feature length animation is ***The Adventures of Prince Achmed***, 1926 which was created by German animator **Lotte Reiniger** (1899-1981) who pioneered silhouette animation.

While **J. Stuart Blackton, Émile Cohl, Winsor McCay, Max and Dave Fleischer, Walt Disney and Lotte Reiniger** present a history of the cartoon and character animation, there were experimental modes of animation as well.

In Germany during the 1920s, the artist **Hans Richter** was creating geometric abstract animations that were short-lived due to Nazi suppression.

In the United States, **Stan VanDerBeek** pioneered what he called “**Cut and Paste Cinema**” by combining collage with animation as well as inter-splicing live footage and scratching as well as painting directly on to the celluloid. A form of animation popularized by Terry Gilliam in the BBC sketch comedy show Monty Python's Flying Circus that first aired in 1969.

Disney Animation: The Illusion of Life, 1981 is a book by **Ollie Johnston and Frank Thomas**, two of the animation masters at Disney's during the Golden Age of animation. The book explains the animation process in nontechnical terms and presents the “**12 basic principles of animation:**”

Squash and Stretch, Anticipation, Staging, Straight Ahead Action and Pose to Pose, Follow Through and Overlapping Action, Slow In and Slow Out, Arc, Secondary Action, Timing, Exaggeration, Solid Drawing, Appeal.

<http://www.animationtoolworks.com/library/article9.html>

Computer Generated Images (CGI) and Computer Animation
Semi-Automatic Ground Environment (SAGE) was a system of large computers and associated networking equipment that coordinated data from many radar sites and processed it to produce a single unified image of the airspace over a wide area. SAGE directed and controlled the NORAD response to a Soviet air attack, operating in this role from the late 1950s into the 1980s.

The displays for SAGE were the first computer generated visualizations and a seminal part of computing history. The computer, internet and computer graphics are largely products of WWII and the Cold War.

The analogue computer artist **John Whitney** used to create his most famous animations was built in the late 1950s by converting the mechanism of a World War II M-5 Antiaircraft Gun Director. The M5 was used during World War II to aim anti-aircraft cannons at moving targets. It took five men to operate it on the battlefield, each inputting one variable, such as the altitude of the incoming plane, its velocity, etc. Whitney realized that the gun director could rotate endlessly, and in perfect synchronization with the swinging of a pendulum. He placed his animation cels on three different layers of rotating tables and photographed by multiple-axis rotating cameras. Color was added during optical printing. Later, Whitney would augment the mechanism with an M-7 mechanism, creating a twelve-foot-high machine. The movement of the pendulum in relation to the rotation of the gun director generated the spiral drawings used in *Vertigo's* opening sequence.

By the 1970s, Whitney had abandoned his analogue computer in favor of faster, digital processes. He taught the first computer graphics class at UCLA in 1972. The pinnacle of his digital films is his 1975 work *Arabesque*

John Whitney launched **Larry Cuba's** career as a computer animator by hiring him to program one of his films. Larry Cuba then went on to create one of the first 3D computer graphic sequences for *Star Wars*, 1977 – the animation presenting the plans of the Death Star.

John Lasseter created Pixar's first animated short "***Luxo Jr.***" – the animation featuring the desk lamp that went on to be incorporated

into Pixar's production logo. The slide presents the development of the film from the animation's script – merely a list of actions and to storyboard. A simple idea may develop into noteworthy production. **Luxo Jr.** is considered the first animation to use procedural animation.

Is **Toy Story** was the first feature-length computer-animated film and the first theatrical film produced by Pixar, directed by **John Lasseter**.

Today, we have several tools for individuals to create animation, from 2D software such as Photoshop, Animate and After Effects or 3D software such as Maya and now Adobe as well as dived in with Maximo and Fuse, perhaps making 3D animation easier than ever. We also have programmatic tools so that animation may be processed through code that you write with Processing, p5js and many other javascript libraries such as three.js. With HTML5 and CSS3 you may even skip coding to create animation in the browser. As the animator John Canemaker put it “if you can imagine it, you can draw it, you can animate it.”

Pre-lecture Screening

Head Shirt, 2016 Craig Foisy

Cicada, 2009 Natalya Serebrennikova

Paradise Apples, 2016 Craig Foisy

The Commute, 2015 by Joy Chiang Ling -

<https://www.youtube.com/watch?v=D0rAQLYJ4S8>

Screening (all are available on YouTube except for The Last Day of Freedom):

The Enchanted Drawing, 1900 J Stuart Blackton, 1min 45sec

Gertie the Dinosaur, 1914 Winsor McCay, 5min 50sec (excerpt)

Out Of the Inkwell, 1921 Max Fleischer, 7min 9sec

The Last Day of Freedom, 2015, Dee Hibbert-Jones, Nomi

Talisman, 32 min (available on Netflix, not YouTube)

The Forger, 2016, Samantha Stark, Alexandra Garcia, Pamela

Druckerman and Manuel Cinema Studio for the NY Times, 16min

Darkness, Light, Darkness, 1989 Jan Svankmajer, 7min 30sec

Old Man, Leah Shore 5min 50sec

Muto, Blu 7min 25sec

Ryan, 2004, Chris Landreth 14min