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Bohigian, George M., "The eye in motion pictures - An illustrated history" (2018). *Presentations*. Paper 7.
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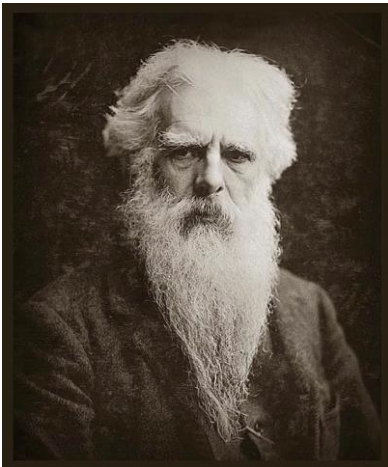
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The Eye in Motion Pictures – An Illustrated History

George Bohigian

The history of early filmmaking and how the physiology of the eye and brain make the pictures "move" will be discussed. Additionally, this presentation highlights the author's favorite motion picture scenes in which the eye becomes the artistic focal point. One of the most deconstructed and analyzed scenes in film history will be explored in Hitchcock's *Psycho*, from Norman Bates' peeking through the motel walls at Janet Leigh's character to the final close-up cut of her pupil and the drain. Other films where the use of the eye are explored include *2001: A Space Odyssey*, *Un Chien Andalou (An Andalusian Dog)* by Salvador Dali, *A Clockwork Orange*, *Dracula*, *Diabolique*, *The Shining*, *The Good, The Bad and The Ugly*, *The Godfather*, *The Terminator*, *The Lord of the Rings* and *Minority Report*.

The bet that led to moving pictures



Eadweard Muybridge and the proof of the bet

When a horse is running or trotting, do all four hooves ever leave the ground at the same time? That was the wager that the former Governor of California, Leland Stanford had with some of his friends. There was much controversy in horse racing circles at the time, and though most people believed that a horse always has one hoof in contact with the ground, Stanford thought otherwise. Because a horse's legs are moving so fast, it's

impossible to tell just by looking, so he needed a way to slow down the movement so it could be studied.

In 1872, Eadweard Muybridge was a world-famous photographer of landscapes. Stanford offered him \$25,000 to find the answer. The experiment took place at Stanford's horse stock farm in Palo Alto, California.

As a horse sped by, it tripped wires connected to the cameras, which took 12 photos in rapid succession. Muybridge developed the images on site and, in the frames, revealed that a horse is completely aloft with its hooves tucked underneath it for a brief moment during a stride. The revelation, imperceptible to the naked eye but apparent through photography, marked a new purpose for the medium. It could capture truth through technology. Muybridge's stop-motion technique was an early form of animation that helped pave the way for the motion-picture industry, born a short decade later.

Frame rate and human vision: The human visual system can process one to five images per second and perceive them individually. While higher rates are perceived as motion. It tricks the human eye into thinking that the image is moving. This called persistence of vision. This causes the retinal images of the eye for a fraction to persist a second beyond their disappearance - this phenomenon permits the succession of still frames on a motion picture film strip to represent continuous movement when projected at a proper speed of 24 frames per second. The human eye naturally see 60 frames per second The illusion of motion pictures is based on the optical phenomena known as persistence of vision and the phi phenomenon. The first of these causes the brain to retain images cast upon the retina of the eye for a fraction of a second beyond their disappearance from the field of sight, while the latter creates apparent movement between images when they succeed one another rapidly. Together these phenomena permit the succession of still frames on a motion-picture film strip to represent continuous movement when projected at the proper speed (traditionally 16 frames per second for silent films and 24 frames per second for sound films). Before the invention of photography, a variety of optical toys exploited this effect by mounting successive phase drawings of things in motion on the face of a twirling disk (the phenakistoscope, c. 1832) or inside a rotating drum (the zoetrope, c. 1834).

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