Voiced by Mel Blanc, the innocent Tweety is said to have been inspired by Warner Bros. animator Bob Clampett's fond remembrances of baby birds he saw in nature films as a child, baby pictures of himself, and his own young son. www.warnerbros.com

Before the advent of computer animation, all animation was done by hand. All the frames in an animation had to be drawn by hand. Considering that each second of animation contains 24 frames (film), one can only imagine the tremendous amount of work that has to go into creating even the shortest of animated films.

*Info taken from Morden Collegiate, Morden Manitoba*
Animation did not just happen instantly. Many people contributed to make animation what it is today, and to make computer animation at all possible. Many steps had to take place, first to make moving images possible, and then developing techniques for creating animations. Here are some of the major milestones which made animation what it is today.

1824 Peter Roget presented his paper *The persistence of vision with regard to moving objects to the British Royal Society.*

1831 Dr. Joseph Antoine Plateau and Dr. Simon Rittmer constructed a machine called a phenakistoscope which produced an illusion of movement by allowing a viewer to gaze at a rotating disk containing small windows, behind which was another disk containing a sequence of images. When the disks were rotated at the correct speed, the synchronization of the windows with the images created an animated effect.

1872 Eadweard Muybridge started his photographic compilation of animals in motion.

1877 Thomas Edison started research work into motion pictures.

1887 Thomas Edison announced his kinetoscope which projected a 50ft length of film in approximately 13 seconds.

1889 George Eastman began the manufacture of photographic film strips using a nitro-cellulose base.

1895 Louis and Augustine Lumiere issues a patent for a device called a cinematograph capable of projecting moving pictures.

1896 Thomas Armat designed the vitascope which projected the films of Thomas Edison; this machine had a major influence on all subsequent projectors.

1906 J. Stuart Blackton made the first animated film called “Humourous phases of funny faces.”

1908 Emile Cohl produced a film depicting white figures on a black background.

1908 Winsor McCay produced an animation sequence using his comic strip character “Little Nemo”.

1909 Winsor McCay produced a cartoon called “Gertie the Trained Dinosaur” consisting of 10,000 drawings.

1913 Pat Sullivan created an American cartoon series called “Felix the Cat.” J.R. Bray devised “Colonel Heeza Liar,” and Sidney Smith created “Old Doc Yak.”

1915 Earl Hurd developed cel animation.

1917 The International Feature Syndicate released many titles including “Silk Hat Harry”, “Bringing Up Father”, and “Krazy Kat”.

1923 Walt Disney extended Max Fleisher’s technique of combining live action with cartoon characters in the film “Alice’s Wonderland”.

1926 Lotte Reiniger produced the first feature-length animated film called “Prince Achmed”.

1927 Warner Brothers released “The Jazz Singer” which introduced combined sound and images.

1928 Walt Disney created the first cartoon with synchronized sound called “Mickey Mouse”.

1943 John and James Whitney produced “Five Abstract Film Exercises”.

1945 Harry Smith produced animation by drawing direct onto film.

1957 John Whitney used 17 Bodine motors, 8 Selsyns, 9 different gear units and 5 ball integrators to create analogue computer graphics.

1961 John Whitney used differential gear mechanisms to create film and television title sequences.

1964 Ken Knowlton, working a Bell Laboratories, started developing computer techniques for producing animated movies.
BEGINNING ANIMATION

Two different techniques were originally used to create animation by hand - **keyframing** and **cel animation**.

**Key Frames**

Considering the immense amount of work that has to go into the making of an animation sequence, the drawing or painting is usually done by more than one person. After a storyboard has been laid out, the senior artists go and draw the major frames of the animation. These major frames are frames in which a lot of change takes place. They are the key points of the animation. Later, a bunch of junior artists draw in the frames in between. This way, the workload is distributed and controlled by the key frames. By doing work this way, the time in which an animation can be produced is cut dramatically, depending on the number of people working on the project. Work can be done simultaneously by many people, thus cutting down on the time needed to get a final product out.

**Cel Animation**

Another advance which helps out tremendously in the process of creating animations is called **cel animation**. When creating an animation using this method, each character is drawn on a separate piece of transparent paper. A background is also drawn on a separate piece of opaque paper. Then, when it comes to shooting the animation, the different characters are overlaid on top of the background in each frame. This method also saves time in that the artists do not have to draw in entire frames, but rather just the parts that need to change such as individual characters. Sometimes, even separate parts of a character’s body are placed on separate pieces of transparency paper.

**Production Drawings**

The first sketches by an artist.
Production Cel
Drawing painted on acetate.

Roger Rabbit
Original Production Cel

Flintstones Gang
Limited edition cel
TERMINOLOGY

Animation Cel
A cel (short for celluloid) is a blank clear plastic sheet used by the studio artist to paint an animated character or object on the animator’s original pencil drawing. The cels are then placed over a background and photographed in sequence to produce an illusion of life in the completed film or cartoon short. Every cel is different but this does not mean that every cel is unique. Often multiple copies of a cel were created by the Inkers as colour models in order to advance their technique and skills.

Storyboard
A series of drawings similar to a comic strip depicting storyline of the film or cartoon short. These drawings will be pinned up on a bulletin board and placed in the order of the storyline.

Keyframe
When someone creates an animation on a computer, they usually don’t specify the exact position of any given object on every single frame. They create keyframes. Keyframes are important frames during which an object changes its size, direction, shape or other properties. The computer then figures out all the in between frames and saves an extreme amount of time for the animator. This is called tweening.

Onionskinning/Layers
Onionskinning is a term that commonly refers to a graphic process in which an image or an animation is composed of a couple of different layers. That is exactly what onionskinning is all about. Imagine it as a series of totally transparent pieces of plastic with different drawing on them. When they are all stacked on top of another, a composite is formed. This is widely used in traditional animation when the background is a separate layer and each character is a separate layer. This way, only layers have to be redrawn or repositioned for a new frame. Onionskinning is also found in computer software where different effects can be placed on different layers and later composited into a final image or animation.
**Rough Animation Drawing**
A rough drawing created by an animator on paper, in pencil, indicating a position or pose of a character or object.

**Clean Up Drawing**
These drawings are created by the assisting department and represent the final stage of animation before the image is transferred to the cel. The sketches can often include colour lines to indicate different ink colours, and notes to the ink and paint department about parts of the character or background in a relevant scene.

**Hand Inking**
Prior to the late 1950's all animation drawings were traced onto cels by using a brush or quill pen.