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Animation: The Who's and Why's

Animation continues to grow for over 400 centuries. Animation has always provided people of all ages a certain amount of entertainment throughout the world. Though it continues to grow, most people have forgotten how animation first started, that is there are more than one way to use animation and the differences between them.

Animation: From Eyes to TV

Image Courtesy of http://courses.ncssm.edu/gallery/collections/toys/opticaltoys.htm

Despite what the public knows, animation actual started in the peripheral vision. According to Richard Spilsbury, Human eyes can sense the patterns of light and shade as well as color and shape. Nerves carry messages about what the eye has sensed to the brain which then processes the information into an image. The brain then compares it to other images that have been seen before and allows them to recognize things so when the brain processes information about an image, it retains the image for a brief moment of time before it is ready to process another image. When a very slightly different image follows in quick succession, the brain blends together the stored image and the new image as if it is seeing a single image so any minor differences between the two images are smoothed out by the brain. When sequences of different pictures or individual frames are shown at 12 frames per second (FPS), or faster, they blend together, creating the illusion of smooth movement, however, any slower than this and the movement appears jerky. Most cartoons and animated movies are shown at 24 FPS, so in other words, each minute of movie has over 1,400 separate frames (Spilsbury, 2007).

The very first animated pictures were optical toys called Magic lanterns, dating from back in the 1640's. Invented by Anthonasius Kirchner, a German scientist, the magic lantern projected images onto a screen by shining light through glass slides that were rotated mechanically, giving movement to the pictures (Spilsbury, 2007). In 1832, Joseph Antoine Plateau created the phenakistoscope, a machine that consisted of a series of drawings in continuous steps of motion on a disk that turned independently of another disk (Spilsbury, 2007). Other inventions appeared soon after, such as the zoetrope, the praxinoscope, and the kinetoscope. One might consider that the biggest and greatest invention was the movie camera, created in 1895 by the Lumiere brothers, Louis and Auguste Lumiere, they developed cinematography by taking sequences of photographs on long strips of film with the use of the movie camera. With this new piece of technology at hand, animators could photograph different pictures and run different speed sequences to create animation (Spilsbury, 2007). These devices were used to screen the first animated films and the many others that came afterwards.

From the book "All About Techniques in Drawing for Animation Production," there were multiple animated films released such as El hotel electrico (The Electric Hotel) by Segundo de Chomon, Humorous Phases of Funny Faces by James Stuart Blackton, and Fantasmagoria by Emile Cohl, who was considered by many historians as the true father of animated cartoons (Barrons, 2006). The first cinematic adaptation of a comic character was Little Nemo by Winsor McCay in 1911, which consisted of over four thousand drawings altogether. In 1912, the first animated film using dolls was titled The Cameraman's Revenge by Russian cinematographer Ladislaw Starewicz which lasted nearly thirteen minutes. The book goes on to say that in 1915, Earl Hurd was the inventor of acetate for animation which consisted of a transparent sheet on which the animated objects and characters were painted, then it's laid over a fixed background, revolutionizing the industry of that era as it was no longer necessary to draw the background in each frame (2006). During that same year, Max Fleischer invented the rotoscope, which was used for capturing live action images that were used as reference for traditional animation.Also in the same year, Fleischer and his studio became famous for such series as "Betty Boop," "Popeye," and "Out of the Inkwell". In 1917, an Italian immigrant living in Argentina named Quirino Cristiani created and directed "El apostol" (The Apostle), it was the first documented full-length film in the history of animation whose duration was about 70 minutes and it was filmed in 35 Millimetre (mm) using drawing and cutout techniques, though unfortunately the film was lost in a fire. Pat Sullivan and Otto Mesmer made the first "Felix the Cat" movie, which then became what is considered to be the first cartoon series that made approximately 175 films between 1919 and 1930. (Barrons, 2006).

The book, "All About Techniques in Drawing for Animation Production," describes that though animation was steadily progressing, it wasn't until Walt Disney stepped into the scene that animation took a drastic turn. It further adds on that Disney had made the first animated film with sound, with Mickey Mouse as the star, titled "Steamboat Willie" that lasted 7 minutes and 45 seconds in 1928 (Barrons, 2006). History has noted that the first animated film in color was also produced by Disney called "Flowers and Trees" using the Technicolor system. Disney produced the film "The Old Mill," it was the first short film to use the multiplane camera animation stand, which consisted of a system for filming different levels, adding depth of field to the two dimensionality of animation in 1937 (2006). The

book states that this system was later used for another Disney film, “Snow White and the Seven Dwarfs,” which was released the same year. Though the fact that it was not the first full-length animated film in history, it was the first to achieve international acclaim from both critics and the public. Also, Ken Knowlton, from New York, made the first attempts at computer animation at Bell Laboratories in 1964 (2006). It further writes that an early attempt at digital animation in 1982, Disney created the movie “Tron”, which has some scenes created by computer. Later, in 1986, the film “The Great Mouse Detective” contained a sequence in side Big Ben in which 3D animation was used to create the machinery of the clock, which was used as a reference for the traditional system resulting in an impressive integration of the images (Barrons, 2006). In a joint effort, Pixar and Disney released the film “Toy Story,” the first full-length film made completely with computers using 3D techniques. (Barrons, 2006).

How it Works: 2d and 3d

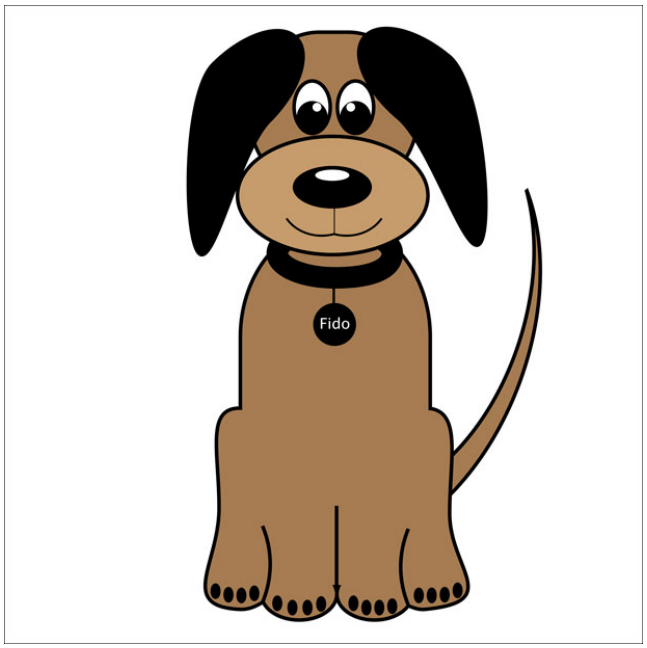

Image courtesy of http://www.publicdomainpictures.net/

Though a person might decide that watching animation on T.V. is easy, but creating it is not. Claire Wyckoff, writer of Communications and the Arts, states that for each animated project, artists create characters, scripts, and story-boards (Wyckoff, 2007). The storyboard is really the first step in the animation process, which visually outlines the story of a movie by depicting the action and staging of the films script. Wycoff states that clean-up artists go over the work and make sure everything is neat, colors match, and details are the same from frame to frame (Wyckoff, 2007). He makes a reference that a typical day for an animator can begin with a review of dailies, which are filmed sections of animation from the previous days. At these meetings, animators, directors, and editors gather to discuss if the animation has been done properly or needs improvement. Then animators usually go back to the drawing board, working alone and together to bring the script to life. If working on 3-D computer animation, an artist may spend the bulk of the day making map paintings of 3-D images to use as scene

backgrounds. These computer paintings are usually of nature—snow, rain, clouds, etc. Once they are created, they save other artists time because they don't have to recreate backgrounds in every frame, they simply pop the map paintings into the background. Other artists focus on clean-up, inbetween frames, or developing the storyboards that outline the main action of a film. At the end of the day, supervisors go to each animator's office to review their work one more time (Wyckoff, 2007). There are more steps to the animation process, but how it's done is determined by what dimension it'll be.

According to animators, one of these dimensions is referred to as 2D. Steve Roberts writes that 2D animation consists of a series of drawings shot one after another and played back to give the illusion of movement. He writes that animation shot in film and projected is played at 24 frames per second (FPS) (Roberts, 2007). He also makes reference that animation for television in Europe, Africa, the Middle East and Australia is played at 25 FPS that in these countries they use a television system called PAL which plays at 50 fields (frames) per second and 25 FPS is compatible with this. If an animated film plays at 24 FPS on the television, a black bar would be seen rolling up the screen. The Americas, the West Indies and the Pacific Rim countries use NTSC, which runs at 60 fields per second (FiPS). Quite often a type of digital converter is used to transfer one speed of film to another speed of video, allowing 24 frames per second film to be shown on a 60 FiPS (NTSC) TV. If one were to stop frame through a video of an animated film, they would find that there are points at which one frame will blur into another. This is how they overcome the incompatibility of the two systems, stop framing through animated movies is a very good way of learning about animation (Roberts, 2007). Tony Mullen writes that an animator would draw a series of pictures, several frames apart, representing main points in the character's motion are called 'keyframes' (Mullen, 2011). He further states that these points would usually be the "extreme" poses, which were the ones most crucial to conveying the illusion of physical substance and motion (Mullen, 2011). Mullen goes on to say that after the animator finished the task of drawing the keyframes, an assistant would come around and draw the in-betweens also known as 'tweening' (2011). He writes that the inbetween drawings provide the characterization or detail. Roberts states that there are three skills that are invaluable when animating with pencils and paper; flipping, flicking and rolling. He writes that these allow the animator to see the drawings moving while you are animating. This principle of animation timing is relevant to all animation. The closer the drawings are together, the slower the movement, the further apart they are then the quicker the movement (Roberts, 2007). Bruce Wands writes that the creative process for 2D animation is a fairly straight process; the idea, the research, script, storyboard, animatic, roughs, In-betweens, clean up, ink and paint, camera, editing, and the final product (Wands, 2001).Wands goes on to say that the first part of this stage is the writing of the story and the script. Normally this is done before any animation drawing is started. However, it is common for some sketching to be done as the story is being written. This generally takes the form of inspirational sketches to define the mood and look of the story or characters (Wands, 2001). While 2D is a fairly straight forward process, 3D branches off in other directions.

Because of this direction, according to the book, *Digital Creativity : Techniques For Digital Media And The Internet,* designing for 3D animation requires the ability to think in four dimensions: the three dimensions of space and the fourth dimension of time (Wands, 2001). The book writes that one of the easiest ways to think of 3D animation is to compare it to a television studio environment. In this live action environment, there are actors, lights, and a camera. In the 3D environment, the actors are the mathematically created objects and characters, and there are digitally simulated lights and a digitally simulated camera. Wands writes that when Hollywood films are made using live action and 3D animation, a mathematical model of the live action set is created in the computer and the two are perfectly matched, so that when the 3D animation and special effects are created, they will blend seamlessly with the live action (Wands, 2001). The book states that the production process starts from an idea or concept, then onto research or sketching, then the script and storyboards, an animatic, what sets it truly apart from 2D animation is that modeling is involved, then the process can go in two directions, animating or lighting and texture maps, then the process goes onto rendering then editing and then it's done (Wands, 2001). There are three commonly used methods of advanced animation; hierarchical animation, inverse kinematics, and particle systems. Hierarchical Animation Hierarchies allow you to link objects together so that they can be animated both as a group and independently (Wands, 2001). A variation of hierarchical animation is inverse kinematics. Instead of the animation happening from the top down, it happens in reverse, from the bottom up. For inverse kinematics to work properly, limits and precise movements of the parts need to be defined mathematically before the animation starts (Wands, 2001). Finally, particle systems are used for a variety of purposes. One of the best things about particle systems is that they generate their own geometry. They can be used to simulate rain, water, fire, sparks, and a whole host of other effects. Though the steps to creating animation between 2D and 3D have similarities, there are some notable differences.

These notable differences are that computer animators develop models of their characters, often using points and lines connected together and situated in a 3-D virtual space. To flesh out their basic models, they use techniques such as shading and rendering which smooth's out the geometric construction to produce realistic shape, light, and shadows. The computer cuts down on the actual animation work, nevertheless. While a stop-motion or celluloid animator creates 24 frames for one second of film, the computer animator can create only three or four key frames and the computer fills in the inbetween frames (Wyckoff, 2007). Wyckoff states that computer animation makes the process less time consuming and less costly, and it has been generating more profit for the studios that produce animated features (2007). Wands further explains the process of character animation for 3D animation is similar to the 2D process only in the beginning stages. Once the character is designed, the process is much different. In 2D character animation, everything is drawn by hand and the computer is used only for the scanning, painting, and production of the final movie. For 3D animation, the character is animated within the computer and nothing is drawn by hand, except the texture maps and possibly the backgrounds. (Wands, 2001).

Stop Motion and Other Animation Programs

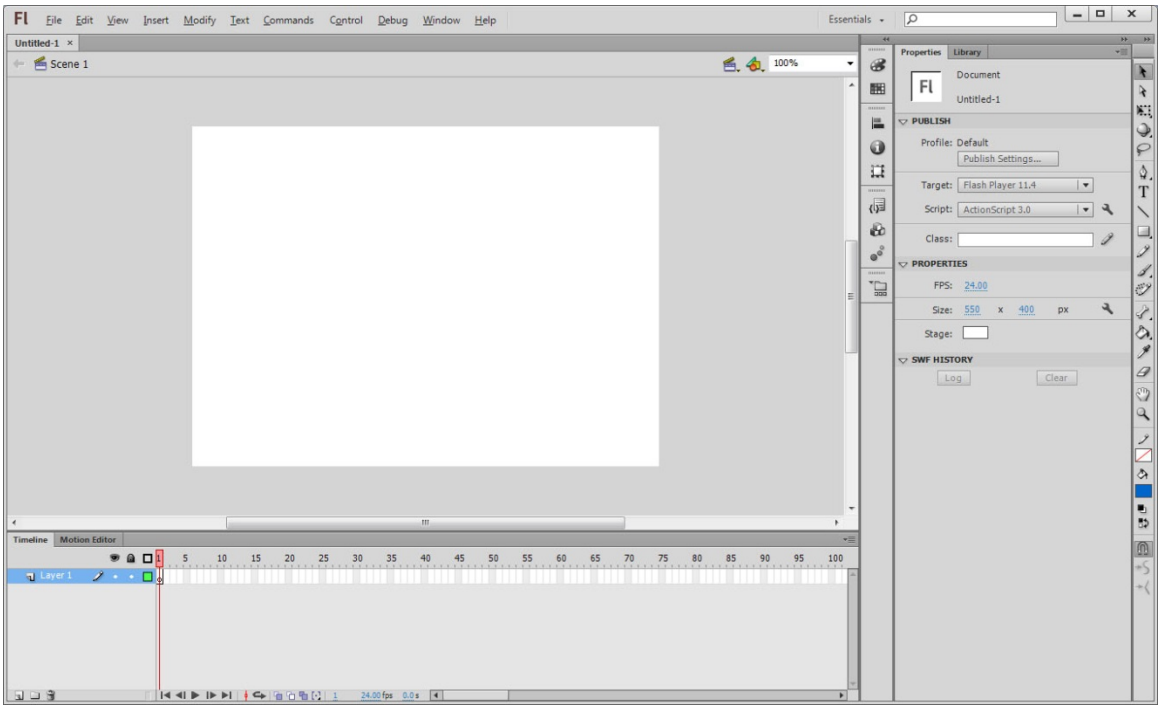

Image courtesy of Danielle Murakami

There are more ways than one in how to animate claims Paul Wells. He writes in his book "The Fundamentals of Animation," 3D stop-motion animation has two distinct histories (2006). The first is the largely European tradition of short stop-motion films made by individual artists, and stop-motion series principally made for children's television (Wells, 2006). The second, and predominantly Hollywood tradition, is the 'invisible' history of stop-motion animation as a branch of special effects for feature length films (Wells, 2006). This is complicated further by the fact that 3D stop-motion animation has got two principal approaches using either puppets or clay models, but also includes films made with objects and artifacts (Wells, 2006). Ken Priebe writes that whether it was for a short film or a brief fantasy sequence in a feature, these stop-motion efforts were designed to hold the audience's attention only for a brief moment, a mere bridge getting them from one feature of entertainment to another (Priebe, 2011). He goes on to say that the short format for stop-motion is a double-edged sword in the opportunity it has lavished on the medium (Priebe, 2011). He also says that for the most well executed stop-motion sequences, such as Harryhausen's 5-minute skeleton fight in 1963's Jason and the Argonauts, the shorter format provided a solid frame to place as much quality as possible into them (Priebe, 2011). Priebe goes on to say that combining quality stop-motion animation with a format long enough to truly involve an audience on an emotional level, through a longer story arc of about 70 to 120 minutes, proved to be a very difficult task to pull off in its early development (Priebe, 2011). The number of stop-motion features produced would often have several years of dormancy between them, depending on the country. The time-consuming nature of stop-motion in general, combined with the extra effort needed to produce more than one hour of it, has partly contributed to this sporadic output (Priebe, 2011). The commercial success or failure of these films would also have an impact on how often they would arrive, since it was also difficult to finance projects of this magnitude (Priebe, 2011). Stop

motion animation is still an ongoing animation technique that's still in use, but animation programs have grown to become the more dominant way to animate, such as Adobe Flash.

In the book Flash Professional CS5 Bible, Todd Perkins writes that since its humble beginnings as FutureSplash in 1997, the Flash authoring tool and the Flash platform have matured into a powerful tool for deploying a wide range of media content (Perkins, 2010). The book goes on that after Adobe acquired Macromedia in 2005, Adobe has expanded Flash capabilities in several Creative Suite products, as well as development tools such as Adobe Flex Builder (Perkins, 2010). Perkins goes into detail by stating that Flash content can be viewed in a few different ways. Perkins writes that the most common method is from within a Web browser, either as an asset within an HTML page or as a Web site completely comprised of a master Flash movie using several smaller Flash movies as loaded SWF assets (Perkins, 2010). The Flash Player is also available as a stand-alone application also known as a projector, which can be used to view movies without needing a Web browser or the plug-in (Perkins, 2010). This method is commonly used for deployment of Flash movies on CD-ROMs, floppy disks, or other offline media formats. Finally, with Flash CS5, content made in Flash can be published as iPhone and iPod touch applications, and released in Apple's App Store. In the book, Flash supports three basic methods of animation: Frame-by-frame animation, Keyframe-based tweened animation, and object-based motion animation (Perkins, 2010). Frame-by-frame animation is achieved by manually changing the individual contents of each of any number of successive keyframes. Keyframe-based tweened animation is achieved by defining the contents of the start and endpoints of an animation using only with keyframes and allowing Flash to interpolate the contents of the frames in between. Flash CS5 has two kinds of keyframe-based tweening: Shape tweening and Classic tweening. Object-based motion tweening is an amazing evolution of keyframe-based or Classic tweening (Perkins, 2010).. In Flash CS5, the animator can now apply a tween to a target object on the Stage, and by simply moving or transforming the object, property keyframes are auto-created to track and animate the changes (Perkins, 2010). Though Flash is a popular animation program for animators to use, it is not the only one that is available.

Prior to starting the book, George Avgerakis and his publisher McGraw did a survey to find out what was the most popular animation software. Their results revealed three animation products: NewTek's LightWave, discreet's 3ds max, and Alias Wavefront's Maya (Avgerakis, 2004). In his opinion, he had classified New Tech's LightWave as the easiest 3D animation program to learn, although it may be shallow in terms of some of its facilities, especially where character animation is concerned (Avgerakis, 2004). In his book, he writes that Discreet's 3ds max is more difficult to learn than LightWave, but its more robust features increase its depth. Further on, both Softimage XSI from Avid and Alias Wavefront's Maya are at the top of the difficulty spectrum (Avgerakis, 2004). In the book, it says that each program offers four methods for viewing a scene, three of which are orthographic: the front view of the X and Y axes, the top view of the X and Z axes, and the Y and Z axes. The fourth is a perspective or pictorial view.

The book continues by saying that orthographic views are devoid of perspective and intended to be simple, clinical, blueprint kinds of displays based on a 3D Cartesian plane grid. Orthographic views are useful for creating, finding, and changing specific elements of a design, such as a seam or points, and for accurately laying out animation (Avegrakis, 2004).

In conclusion, from the past to the present animation continues to flourish. There are more techniques being developed to further the animation process. Several animation studios are even creating more animation programs to further animation. Though there are discussions over whether one animation method is better than the other, there is one thing that they do agree on. That's on how exciting and fun it is to create movement from the palm of their hands.

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