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Independent Study Mentorship

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Arcs in Animation

Research Assessment 3

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Lasseter, J. "Principles of traditional animation applied to computer animation." *Comput. Graph.* 21, 4 (July 1987), 35-44.

An animator needs to have a strong understanding of the twelve principles of animation in order to create high-quality animation. These principles were originally outlined by Walt Disney Animation Studios in the 1930's for hand-drawn 2D animation. However, these principles are just as critical in modern computer animation as they were for old Disney animation. There are 12 concepts that make up the principles of animation that were first published in, "*The Illusion of Life*" by Ollie Johnston and Frank Thomas. Now, these concepts are taught to animators through various exercises like a bouncing ball and a tail wave that show most of the principles.

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One of the articles I read was by John Lasseter, the founder of Pixar, on all twelve principles of animation in relation to computer animation. While I have learned about these principles in my animation courses this article was still very interesting as it went into great depth on some of the principles that I want to work on improving. For me, one of the most interesting principles from this article was the principle of arcs, defined as the visual path for natural movements. (Lasseter 36) While the section on arcs was rather short it was full of valuable information and had a few diagrams that broke down the concepts in relation to splines. This is a principle that is used for realism and believability with how an object moves through space. Arcs are very important to animation and its motion and this principle is used in many standard animation exercises such as the bouncing ball and the tail wave. Both of these animation exercises use the principle of arcs in order to show a natural movement that doesn't look stiff.

This article also discussed the transition from hand-drawn animation to computer animation and how the twelve principles had to be adapted to animation using a computer. Originally in hand-drawn animation, all of the keyframes and in-betweens of a scene were drawn and this allowed for full control over arcs in relation to timing. With the transition to 3D animation, the in-betweens were automatically interpolated by the computer based on the keyframes set by the animator. Using this interpolation all of the motion was translated into splines or continuous curves on a graph that showed the motion of the animation. While interpolation saved time it also caused some problems since the spline of an arc was changed

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when the animator altered the timing. (Lasseter 41) This alteration of arcs in relation to timing caused some arcs to flatten out instead of having a smooth wide arc that went down sharply on both sides. Flat arcs are not ideal in animation since they don't look natural for motion. These flat arcs can be fixed by editing the splines in a graph editor. I have edited arcs and timing in the Autodesk Maya editor in order to make a wide arc with ease in and ease out. I have used this technique in various animations including a ball bounce and a walk cycle.

After reading this article by Lasseter I was able to find a lot of useful information that connected the principles to what I have been taught to do in animation. This information on arcs will help me with the technical aspects of animation within the graph editor and how to alter the curves in order to achieve the motion and timing I want. I hope to incorporate the information on interpolation and spline curves into my work in animation through the graph editor in Maya. Overall this paper by Lasseter was very interesting and showed the basics of technical side behind computer animation.