

# PRINCIPLES OF ANIMATION

*By Karl Cleveland but derived largely from The Illusion of Life by Frank Thomas and Ollie Johnson*

## 1. Appeal, Personality, and Solid Drawing

Quite simply, animation is more interesting if the characters and scene being depicted have appeal, personality, and are well drawn. Solid drawings have weight, depth, balance, shading, and correct perspective. Appealing characters have charm, personality, and simplicity. Drawings that are too complicated can be difficult to read, especially when quickly animated. Many animators avoid "twinning" or perfectly symmetrical design. Characters whose arms and legs (or even their facial features) are in identical positions on each side of their body tend to look "wooden" and unnatural.

## 2. Timing

Timing is essentially the speed of an animation or action. Timing can give meaning to movement as it carries with it implications as to the mass/weight of characters as well as their emotional state. Large heavy objects have more inertia than light objects. Tired characters move more slowly. Nervous characters may not be able to stay still. Motion carries messages and timing is critical to getting your message across. Timing is not just about the speed of action, but also about pacing. Action sequences may be more exciting if they move quickly with many edits and cuts. Dramatic pauses can create dramatic tension or, with comic timing, a better punch line.

## 3. Acceleration and Deceleration

Acceleration and Deceleration, also referred to as Slow-In/Slow-Out, or in Flash as Easing, has to do with the gain or loss of momentum. In nature, things rarely move at a constant speed. A car or runner may move at a constant velocity, but it must accelerate to get there and decelerate to stop. When you create a tween between key frames, Flash interpolates the in-between frames such that they are evenly spaced. Such "linear animation," where objects move at the same constant speed, tends to look cold and lifeless. Adding easing (or changing the acceleration/deceleration) makes objects move in a more organic and interesting way.

## 4. Squash and Stretch

Squash and stretch can be used to convey the rigidity of objects. While some objects, like a bowling ball, are rigid, others are more flexible, like a rubber ball. When a rubber ball hits the ground, the impact causes it to squash. But, because the ball cannot change volume, if it squashes vertically, it will stretch horizontally. Organic elements are flexible and adding squash and stretch to objects helps bring them to life. Cartoon characters often squash and stretch far more than would be true in nature, but such effects lend interest, personality, and meaning to their actions.

## 5. Exaggeration

Exaggeration can lend interest and understanding to animation. Exaggeration is especially used in cartoon animation as the direct mimicry of reality can end up being dull and static in cartoons. Moreover, cartoon drawings tend to be simplified; so the subtleties of expression that we may pick up in a photograph of a human face, for example, may be lost in a cartoon face unless the feelings or "essence" of the expression is exaggerated. Thus, in cartoons, sad characters are very sad and happy characters are down-right ecstatic. Moreover, characters may move with more acceleration and deceleration, more squash and stretch, more anticipation and follow-through, etc. than would be true in nature.

## **6. Secondary Animation and Secondary Action**

Secondary actions complement primary actions in an animation and help bring a scene to life. In cartoons, often much of the scene is static. There will be one primary animation, such as a mouth moving. However, if that is the only thing that is animated, it may call attention to the essential static nature of the rest of the scene. By animating at least one other element in the scene, the whole scene can become more life-like. Secondary actions add a realistic sense of the complexity of life to a scene. However, too much complexity or secondary actions that are too dominant may distract the viewer and take attention away from the main action. Important facial expressions on a cartoon character, for example, may become secondary to the animation of the character's body and be missed by the audience unless the expression comes before or after the more dominant movement of the body.

## **7. Moving in Arcs**

Motion in an arc is often more expressive and natural looking. A ball that is thrown will be affected by gravity and move along a parabolic trajectory. Similarly, humans and animals don't move in straight lines, but rather along arched trajectories. If you examine the movement of human limbs, you'll see that they move along an arc, given our joints and anatomy. Even a character that is turning its head from left to right will often dip their chin downwards and then back up (in a slight arching motion) as they move. The exception would be a robot or other kinds of mechanical movement.

## **8. Anticipation**

Demonstrating anticipation in animation can lend a sense of drama to a scene and contribute to its understanding. Actions occur in three stages: in the preparation for the action, in the action, and in the termination and result of the action. Anticipation prepares the audience for an action and indicates what is about to happen. It also lends a sense of realism to the scene. When throwing a baseball, the baseball doesn't just fly out of a pitcher's hand. Rather, the pitcher must cock back (in anticipation of throwing), then throw the ball, then follow-through with their arm and body. How much a pitcher cocks back may indicate how hard they are about to throw the ball and prepare the audience for the fast action that is about occur, so they don't miss it.

## **9. Follow Through and Overlapping Action**

Like anticipation, which is the preparation for an action, follow-through is the termination of an action. Things rarely come to a complete and sudden stop. Rather, momentum will carry objects past their termination points. Moreover, characters have elements that will exhibit weight and drag when in motion. For example, if you are running and manage to stop your feet on a dime, your arms (and any loose elements like clothing) are likely to lunge forward a bit and take a few moments to settle. Put simply, actions have reactions. And, the conclusion of one action should prompt the beginning of a related overlapping action. When a pitcher throws a ball, for example, the ball begins moving while the pitcher's arm continues to follow through.

## **10. Staging**

Staging has to do with focusing the audience's attention on what is relevant and setting the scene so that the presentation of an idea is clear and understandable. This might include conveying a mood, showing a character's expression or personality, or making an action clearly understandable. It is similar to staging in theatre and cinema and is accomplished, in part, by camera angles and how the characters are positioned. For example, if you wish to convey that a character is a scary giant, it may be useful to stage the scene such that we are looking up at the character (its feet may be huge, and its head may be tiny because of our perspective). Similarly, if we wish to convey that a character is alone in the desert, it may be useful to have an establishing shot from far away that sets this scene. Such establishing shots provide context for the audience and are a frequent device in film and animation.