Motion Design:
A crash course

What is motion design?

Motion Design is a subset of graphic design in that it uses graphic design principles in a filmmaking or video production context (or other temporally evolving visual media) through the use of animation or filmic techniques.

Motion Literacy

Communicating via motion involves issues of both “what” is moving across the screen – typographical, pictorial, or abstract elements – and “how” that something is moving.

The “how” question refers to the kinetic form and its grammar, defined by both space and time dimensions of motion such as velocity and amplitude. Kinetic form itself may convey a broad spectrum of notions and emotions: from a sensible gesture, through dramatic tension, to a violent collision. Of course, motion in combination with pictures and words (and sound, if available) multiplies those irresistible opportunities in making meaning.

Spatial Considerations

Spatial Transformations

Spatial transformations describe the conditions of elements with regard to their positioning, orientation, size, and relative scale inside the frame. These factors play a considerable role in determining how their movements affect the space they “live” in.

Rotation X, Y, and Z Translations Size

Direction

The direction or “route” that elements travel is also important to how movements will occur across the frame. There are two types of directions that elements can move– linear and nonlinear– in a straight line or on a curve. Mechanical objects, such as pendulums and wind-up toys, travel in predictable, linear directions. On the other hand, living subjects and phenomena that are affected by natural forces, such as tree branches, water, and animals, move in unpredictable, erratic ways. They can also change their spatial orientation as they travel.

Left Right Up Down Away Towards

Motion Paths

Motion paths are one of the most powerful devices that allow you to specify the course of travel that elements take over a given time interval. They are represented as straight lines, curves, or a combination of lines and curves. Both linear and curved paths can be modified to control the direction that objects travel in a composition.

Frame Mobility

The study of movement is not just confined to how elements travel inside the frame; it also involves the perceived motion of the viewer with regard to how the content is framed over time. Frame mobility, which is achieved through actual camera movement or simulated camera movement, can breathe life into scenes and achieve various compositional framings.

Panning involves moving the camera horizontally to create the impression of a subject being scanned. A slow pan of a panoramic scene can approximate the motion of moving one's head from side to side to take in the view.

A **whip pan** (also referred to as a flick pan, zip pan or swish pan) is an extremely brisk side-to-side movement that produces the effect of blurred, horizontal motion. This simulates the action of the human eye abruptly moving from one subject to another. (Whip pans were commonly used in action genres such as kung-fu movies during the 1970s.)

Tilting produces the effect of scanning a subject or space vertically from top to bottom or vice versa. It can enhance the subject's height and depth by showing small increments of it at a time. A

long, slow tilt in an upward direction can express the sheer bulk of a subject. Tilting can also be used to change the angle of framing or to gradually reveal offscreen space. This can produce suspense or anticipation as the camera's motion forces our attention in a precise direction without knowing when it will cease and what will be revealed.

Tracking (also referred to as dollying) involves changing the camera's position in relation to the subject so that it travels forwards, backwards, diagonally, circular, or from side-to-side in the frame. This action can bring viewers physically closer to or further

away from a subject or make subjects appear as though they are being followed. The movement of foreground and background past the periphery of a shot can create a sense of tension or excitement.

Zooming increases or decreases the camera's field of view, magnifying a portion of the scene without moving the camera.

The grammar and message of motion is present even in framing a composition.

EXAMPLE : http://www.youtube.com/watch?v=dSmhWkJ4MMA

Temporal Considerations

Frames

In film and video, time is described numerically as frames per second (fps). This frame rate describes the maximum speed that animations can play to create the illusion of continuous, believable motion.

In 1967, the U.S. Society of Motion Picture and Television Engineers (SMPTE) adopted a rate of 30 fps and introduced timecode, a method in which time is calculated in the form of an eight-digit, 24-hour clock consisting of 0 to 23 hours, 0 to 59 minutes, and 0 to 59 seconds. Seconds are subdivided into frames, and the number of frames varies, depending upon the specified frame rate.

00:02:23:15

0 hours : 2 minutes : 23 seconds : 15 frames

Velocity

Velocity is the speed in which elements move or change over time and space. This is a considerable determining factor in achieving dynamic, lifelike animation. Like direction, velocity can be linear or nonlinear.

Linear Velocity

If the velocity of an element's motion is linear, it proceeds at a steady, uniform rate. Devices such as clocks, CD players, gears, and electric fans are a few examples in which the rate of motion progresses at a consistent incremental pace. Although linear velocity does not lend itself to lifelike animation, it may be applicable to the subject matter or to your conceptual message.

Nonlinear Velocity

It is seldom that living things in the natural world move at a constant, linear pace. Natural movements of living things typically begin slowly, speed up, and slow down, unless an obstacle interrupts them. Human and animal motion, as well as motion caused by natural forces, is very erratic and unpredictable. It is highly unusual for things to start or stop instantaneously. Inexperienced animators may overlook this fact and produce motion that feels too “linear.” In contrast, some of the most sophisticated animations contain subtle, less predictable changes in the way things move. The result is a more gradual, fluid-looking animation in which the content assumes a more dynamic, realistic persona.

12 principles of animation

Squash and stretch

In the physical world, most natural objects deform as they move. For example, when a rubber ball hits the ground, it becomes temporarily squashed before propelling itself into the air while being stretched. When a figure crouches down, it appears to be squashed; when it leaps into the air, it looks stretched.

The technique of squash and stretch can help establish the physical basis of objects that have mass, giving their motions the illusion of weight and volume through distortion. This type of distortion can range from subtle to extreme.

Anticipation

Most lifelike actions have an opposite preceding action. Before leaping off the floor, the dancer executes a backwards motion before moving forward. Before swinging a golf club, the golfer twists his body into a coil, bringing the club over his head. In these cases, the word “before” is key; it denotes the idea of pre-action or implied action. Anticipation creates a sense of natural movement while dictating to the viewer that an upcoming action is about to occur. A commercial for Asics footwear, advertising the Onitsuka line of shoes, illustrates the virtues of strength, agility, and speed in a segment where anticipation is applied to the snake just before it lunges at the main character.

Staging

This principle is akin to staging as it is known in theatre and film Its purpose is to direct the audience's attention, and make it clear what is of greatest importance in a scene; what is happening, and what is about to happen. Johnston and Thomas defined it as "the presentation of any idea so that it is completely and unmistakably clear", whether that idea is an action, a personality, an expression or a mood. This can be done by various means, such as the placement of a character in the frame, the use of light and shadow, and the angle and position of the camera. The essence of this principle is keeping focus on what is relevant, and avoiding unnecessary detail.

Straight ahead action and pose to pose

These are two different approaches to the actual drawing process. “Straight ahead action” means drawing out a scene frame by frame from beginning to end, while “pose to pose” involves starting with drawing a few key frames, and then filling in the intervals later. “Straight ahead action” creates a more fluid, dynamic illusion of movement, and is better for producing realistic action sequences. On the other hand, it is hard to maintain proportions, and to create exact, convincing poses along the way. “Pose to pose” works better for dramatic or emotional scenes, where composition and relation to the surroundings are of greater importance. A combination of the two techniques is often used.

Follow through and overlapping action

Follow through and overlapping actions enable the flow between actions to be carried smoothly. These subtle techniques can be used to make an element's motion more believable by adding a little detail. **Follow through** involves the continuation of an action past its termination point. For example, when a woman swings her head, her hair continues moving after the main head movement ceases. **Overlapping** occurs when an element changes its direction when it is in motion, and its smaller parts assume the new direction of motion a few frames later. Slightly varying the timing and speed of those parts maintains a continual flow between the actions, making the movements seem more natural.

Slow in and slow out

The movement of the human body, and most other objects, needs time to accelerate and slow down. For this reason, animation looks more realistic if it has more drawings near the beginning and end of an action, emphasizing the extreme poses, and fewer in the middle. This principle goes for characters moving between two extreme poses, such as sitting down and standing up, but also for inanimate, moving objects.

Arcs

Most natural action tends to follow an arched trajectory, and animation should adhere to this principle by following implied “arcs” for greater realism. This can apply to a limb moving by rotating a joint, or a thrown object moving along a parabolic trajectory. The exception is mechanical movement, which typically moves in straight lines.

An object in motion that moves out of its natural arc for no apparent reason will appear erratic rather than fluid. Therefore when animating (for example) a pointing finger, the animator should be certain that in all drawings in between the two extreme poses, the fingertip follows a logical arc from one extreme to the next.

Secondary action

Most movements in the physical world are the result of cause and effect. For example, when a basketball hits the rim of the backboard, the rim wobbles back and forth. Human figures typically swing their arms back and forth while walking. These actions work together in support of one another. With this in mind, the secondary actions of the basketball rim and the swinging arms result directly from the primary or action.

Timing

In animation, timing involves choreographing how actions are spaced out according to the sizes and “personalities” of elements. Timing can affect how we perceive an object’s size or mass. For example, a large object that moves at a slower pace than a small object may take more time to accelerate or decelerate.

Timing can also contribute toward mood or atmosphere. Fast movements typically produce snappy, energetic effects, while longer movements can feel more deliberate and dignified.

Exaggeration

Exaggeration is an effect especially useful for animation, as perfect imitation of reality can look static and dull. The level of exaggeration depends on whether one seeks realism or a particular style. The classical definition of exaggeration, employed by Disney, was to remain true to reality, just presenting it in a wilder, more extreme form. Other forms of exaggeration can involve the supernatural or surreal, alterations in the physical features of a character, or elements in the storyline itself.

Solid drawing

The principle of solid drawing means taking into account forms in three-dimensional space, giving them volume and weight. In every frame, an animated object needs to seem to have the same weight, mass and volume. If this principal is broken, the object will seem wobbly, unsubstantial, or amaturish.

Appeal

Appeal in an animated character corresponds to what would be called charisma in an actor. A character who is appealing is not necessarily sympathetic - villains or monsters can also be appealing - the important thing is that the viewer feels the character is real and interesting. A weak drawing or design lacks appeal. A design that is complicated or hard to read lacks appeal. Clumsy shapes and awkward moves all have low appeal.

EXAMPLES : http://www.youtube.com/watch?v=xqGL1ZLk3n8

Birth, Life and Death

When coordinating motion, important consideration should be given to the manner in which actions begin, the duration that they occur, and the manner in which they end. Elements can move into and out of the frame from any of its four edges, fade in or out, or grow larger or smaller. Additionally, they can be introduced by other elements, transformed through morphing, or constructed piece-by-piece.

The process

Design EVERYTHING first

Storyboard in high detail

Create all assets and plan the animation

Cool stuff

Se7en

http://www.youtube.com/watch?v=4thzyFFdvVc

Catch Me if You Can

http://www.youtube.com/watch?v=gaLDyrun_Cc

Mad Men

http://www.youtube.com/watch?v=UXyWBmbQL84

Prima Love

https://vimeo.com/22479528

https://vimeo.com/22482890

Prima Cool

https://vimeo.com/15428244

https://vimeo.com/15427569

Sources

http://en.wikipedia.org/wiki/12_basic_principles_of_animation

Motion Graphic Design - Applied History and Aesthetics by Jon Krasner