

CHAPTER HIGHLIGHTS

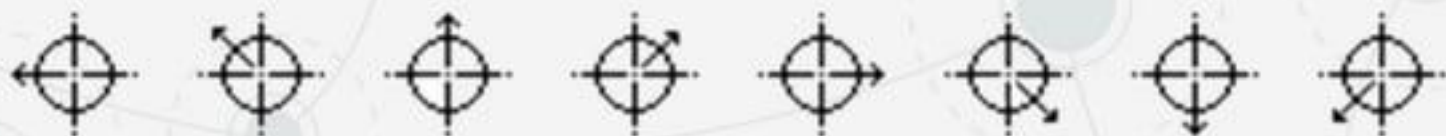
- Animation basics
- Traditional animation techniques
- 2-D animation techniques:
 - Keyframe
 - Tween
 - Programmed
- 3-D animation:
 - Motion capture
 - Kinematics
 - Animating with physics
- Guidelines for animation in multimedia

PINNACLE OF MODERN MULTIMEDIA

- Animation draws inspiration from each of the other media.
- Computer is a partner in creative expression.
 - It lowered costs and increased ease of creating animation.
 - It supports creative expression through:
 - Interactivity
 - 3-D sensory experience
 - Embodiment and implementation of rules of behavior.

ANIMATION BASICS

- **Animation:** rapidly displayed sequence of individual, still images.
- Made possible by "**persistence of vision.**"
 - Images formed on the retina persist for a short period of time after stimulus has disappeared.
 - This physical memory of the retina produces the illusion of motion.



ANIMATION BASICS

- Flipbook technique
 - Still images showing a different stage of motion are created on each page.
 - Pages are "flipped" in rapid succession to view the motion.
 - Animation basics used in flipbook:
 - Quality of motion is based on rate of display.
 - Speed is based on differences between images.
 - **Onionskinning**: a technique used to draw new image based on the previous image.
 - Registration: physically aligns images with one another.

TRADITIONAL ANIMATION

- Film based process
 - Images are photographed and recorded as separate frames on long strip of transparent film.
 - Film passed in front of light source and animation appeared on a screen.
- Film enhanced possibilities of animation.
 - Multiple reels allowed longer animations.
 - Projectors displayed images at reliable frame rates.
 - Animators could add sound to the motion.

CHALLENGES OF TRADITIONAL ANIMATION

- Number of images to create.
 - 24 frames per second requires 1,440 individual still images for each minute of animation.
 - Methods to generate images include:
 - Shooting on twos cuts number of images in half.
 - Cycle of images can be reused to extend repetitive motion.
 - Holds produce sequence of identical drawings to extend a particular state or action.

CHALLENGES OF TRADITIONAL ANIMATION

- Artistic strategies to create realistic world require:
 - Awareness of how things move in the world.
 - Ease-in and ease-out address the physics of motion.
 - Overshooting a resting point addresses kinetic energy of motion.
 - Different components of objects move independently of one another (overlapping motion).
 - Exaggerate motion for dramatic effect using:
 - Variations in speed
 - Stretch and squash.

Traditional Techniques

- Strategies for achieving motion have been applied to:
 - Paper cut-outs
 - Clay figurines
 - Puppets
 - Natural objects photographed, reposed and re-photographed.

CEL ANIMATION

- Perfected and made popular by Disney studios.
 - Cel: drawings of individual frames made on sheets of celluloid.
 - Drawings were then photographed to produce the animated film.
- Technique that directly influenced development of digital animation.

CEL ANIMATION ADVANTAGES

- Artists saved drawing time.
 - Fixed components of a scene were drawn once and layered on the bottom of a stack of celluloid sheets.
 - Moving components were drawn separately and placed on top of the fixed scene components.
- Gave precise control over elements.
 - Individual cel layers could reproduce interdependent, complex motions.

CEL ANIMATION ADVANTAGES

- Encouraged division of labor and promoted high artistic standards.
 - Master artists drew key frames or extremes.
 - Assistants drew the tweens.
 - Inkers transferred drawings from paper to celluloid.
 - Opaquers applied colors to the celluloid.
 - Additional specialists included:
 - Producers
 - Directors
 - Script writers
 - Audio specialists
 - Camera operators
 - Checkers.

PRODUCING CEL ANIMATION

- Cost and complexity of creating animation required a carefully defined process.
 - **Storyboard**: sequence of drawings that sketch out content of major scenes in the production.
 - **Pencil test**: series of simple sketches that are photographed and projected to test the design of the animated sequences.
 - **Scratch track**: draft of animation's audio track.
 - **Leica reel**: working draft of the complete animation.

PRODUCING CEL ANIMATION

- Uses specialized equipment in production process.
 - Specialized paints to convey proper hue.
 - Specialized camera and lighting to capture cels.
 - Devices to:
 - Track changes in paths of animated characters.
 - Align and hold the cels for camera shots.
 - Synchronize and edit the final film.
- Cel animation is complex, demanding, and expensive animation.
 - Computers dramatically improved the process.