Animation

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Information

Motion
Action and events
Story and/or process
Overview

Motion
Problems with animation
Techniques for animation
  ■ Fundamental principles
    Disney Animation, F. Thomas & O. Johnston
  ■ Film
    Grammar of the Film Language, D. Arijon
  ■ Sequential art / stills
    Understanding Comics, S. McCloud

Motion and Action
Motion as a Visual Cue

Psi effect
- Discrete frames merge to smooth motion
- Flicker fusion

Dominant (stronger than color, shape, ...)
Pre-attentive / sensitive to motion at periphery
Triggers orientation response
Motion parallax like stereopsis (rocking)
Segments by common affine transformation
  - Example: Common fate

Object constancy
  - Example: Animated transitions

Motion grouped hierarchically
  - Biological motion recognizable

Michotte [1946]

http://www.carleton.ca/~warrent/210/lecture03/A%20Michotte/michotte.htm
Animation

Four-stroke combustion cycle

Four-stroke combustion cycle

http://auto.howstuffworks.com/engine3.htm

Questions
Problems

Cannot simultaneously attend to multiple motions
Segmenting motion into objects, events, actions
Understanding and inferring causality
Difficult to estimate paths and trajectories
Motion is fleeting and transient
Anthropomorphizing physical motion may be confusing or lead to incorrect conclusions

Tversky et al. 2002

Rotary Engine

Rotary engine

Animation vs. interactive animation
Pythagorean Theorem

Thompson-Riding experiment
- Group 1: Static diagram
- Group 2: Discrete steps
- Group 3: Continuous motion
Group 3 outperformed 1 and 2

Examples
- Blinn’s animation
- Interactive proof

Figure 4: Thompson & Riding's (1990) Shears and Rotations Diagram.
Film Grammar:

Shots To Sequences
Shots

Definition: A shot is a continuous piece of film

Types:
- Distance [Figures 3.1-3.6]
  - Close-up
  - Close shot
  - Medium shot
  - Full shot
  - Long shot
- Background, foreground
- Over the shoulder
- Point of view

Edits

Types:
- Single master shot
- Master shot inter-cut with shorter takes
- Two interwoven master shots

Parallel action [p. 9]
- Action and reaction
- Question and answer
Matched Cuts

By position [Figure 3.7]
By movement [Figure 3.8]
By direction of look [Figure 3.9]

Examples

Figure 9.1 – Continuous motion
Figure 10.1 – Cutting after vertical movement
Figure 10.2 – Cutting after downward move.
Figure 10.9 – Cutting before turn
Figure 11.34 – Cutting upon entry
Figure 11.56 – Cutting when going thr. Door
Figure 12.2 – Horizontal motion
Figure 14.2 – Insert cut for recognition
Figure 16.18 – North by Northwest
Sequences

Definition: Spatially or temporally contiguous
Snow White [p. 218-220]
1. Introduction: Queen and Mirror; Snow White in courtyard; arrival of Prince.
2. Queen orders Snow White’s death; Snow White and huntsman.
3. Panic in the woods; Snow White meets animals; they take her to dwarfs’ cottage and help clean house.
4. Dwarfs in mine; match home and find something in their house.
5. Discover Snow White; agree to let her stay.
6. Dwarfs wash up for dinner; scrub Grumpy.
7. Queen turns into a witch.
8. Dwarfs entertain Snow White; she sings for them; dwarfs give her their bedroom.
9. Witch prepares poisoned apple; leaves for cottage.
10. Dwarfs leave for work, after warning Snow White.
11. DROPPED
12. DROPPED
13. Snow White making pies; witch arrives and enters house.
14. Animals warn dwarfs; they return too late; Snow White poisoned; witch falls off cliff.
15. Dwarfs cry at Snow White’s bier.
16. Glass coffin; Prince comes; Snow White awakens and goes away with Prince.

Sequential Art

[Comics]
From Frame to Frame [McCloud]

1. Moment to moment
2. Action to action
3. Subject to subject
4. Scene to scene
5. Aspect to aspect
6. Non-sequitur

p. 70-77
Fundamental Principles

1. Squash and stretch
   ■ Example of the bouncing ball [p. 19]
2. Anticipation
   ■ Example of Oswald reaching into his pocket [p. 20]
3. Staging
   ■ Example of country mouse doing one thing at a time [p. 22]
4. Straight-ahead vs. Post-to-pose
5. Follow through and overlapping action
6. Slow-in and slow-out
7. Arcs
8. Secondary action
9. Timing
10. Exaggeration
11. Solid drawing
12. Appeal

Summary

■ Convey motion, action, story, process
■ Problems
  ■ Divided attention
  ■ Segmentation into actions and events
  ■ Transient
■ Techniques
  ■ Edit shots into sequences
  ■ Spatial-temporal montage
  ■ Sequence of stills very effective
Effective animation? Slithy?