Animation Principles

Animation Objectives

- Expressiveness
  - Artistic expression
  - Extremely hard to automate
- Realism
  - Hard to do by hand
  - Easier to automate, but we lose control

Goals of expressive animation

Make characters move in convincing way to communicate personality and mood

- Walt Disney developed a number of principles
- Computer graphics animators have adapted them to 3D animation

Animation principles

1. Squash and stretch
2. Staging
3. Timing
4. Anticipation
5. Follow through
6. Overlapping action
7. Secondary action
8. Straight-ahead vs. pose-to-pose vs. blocking
9. Slow in, slow out
10. Exaggeration
11. Appeal

Squash and stretch

Squash: flatten an object or character by pressure or by its own power

Stretch: used to increase the sense of speed and emphasize the squash by contrast

Note: keep volume constant

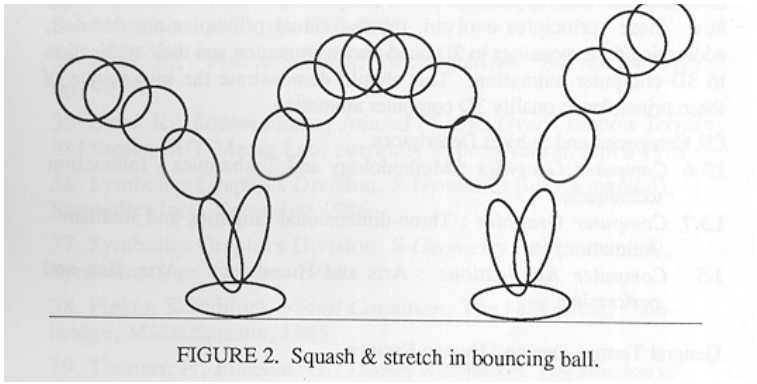


FIGURE 2. Squash & stretch in bouncing ball.

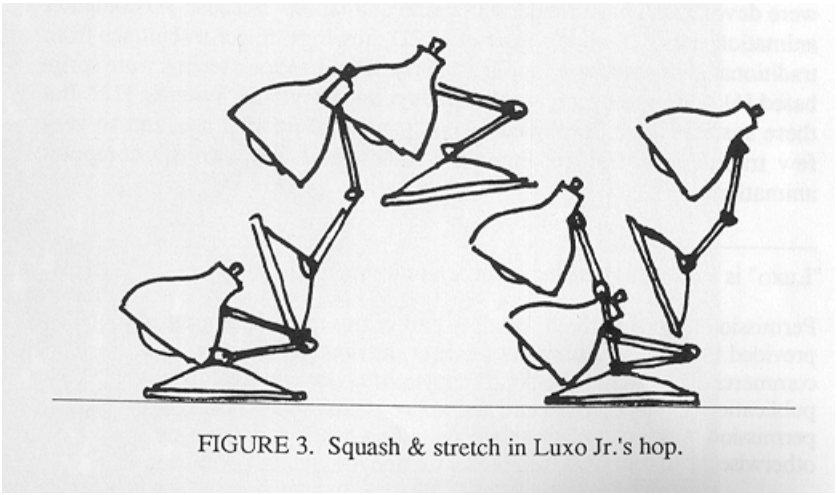


FIGURE 3. Squash & stretch in Luxo Jr.'s hop.

Staging

- Present the idea so it is unmistakably clear
- Audience can only see one thing at a time
- Useful guide: stage actions in silhouette
- In dialogue, character fase ¾ towards the camera, not right at each other

Timing

- An action breaks down into:
  - Anticipation
  - Action
  - Reaction
- Timing affects weight:
  - Light object move quickly
  - Heavier objects move more slowly
- Timing can completely change the meaning of an action

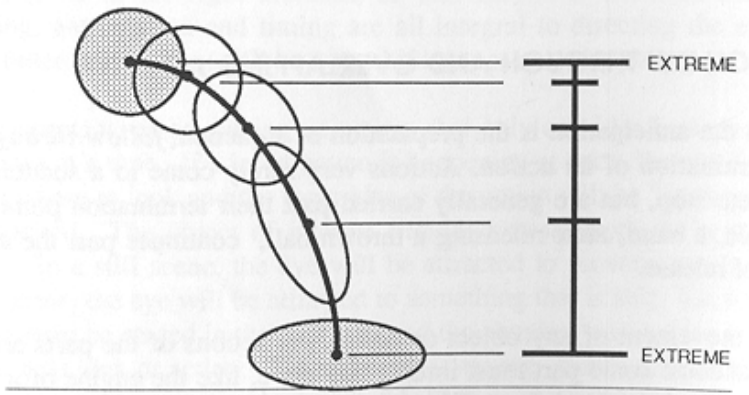


FIGURE 9. Timing chart for ball bounce.

Anticipation

- An action breaks down into:
  - Anticipation
  - Action
  - Reaction
- Anatomical motivation: a muscle must extend before it can contract
- Prepares audience for action so they know what to expect
- Directs audience's attention
- Amount of anticipation can affect perception of speed and weight

Follow through

- Action seldom come to an abrupt stop
- Physical motivation: inertia

Overlapping action

One part initiates (leads) the move. Others follow in turn.

- Hip leads legs, but eyes often lead the head.
- Loose parts move slower and drag behind.

Overlaps apply to intentions. Example: settling into the house at night

- Close the door
- Lock the door
- Tace off the coat

Each action doesn’t come to a complete finish before the next starts

Secondary action

An action that emphasizes the main point, but is secondary to it.

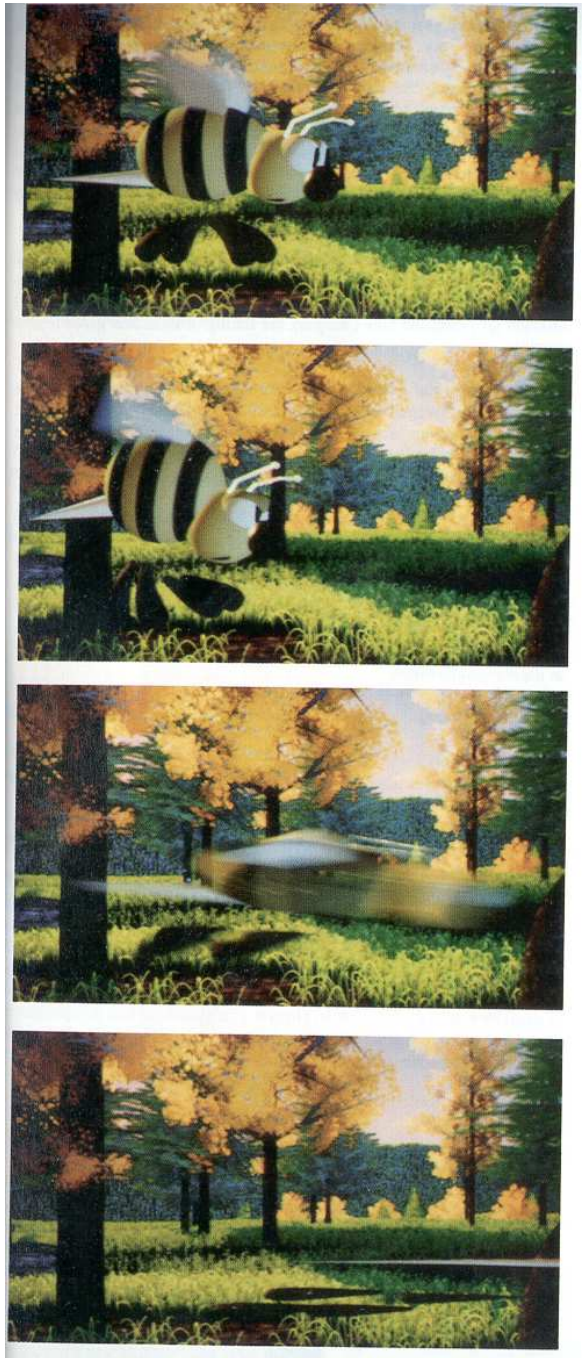


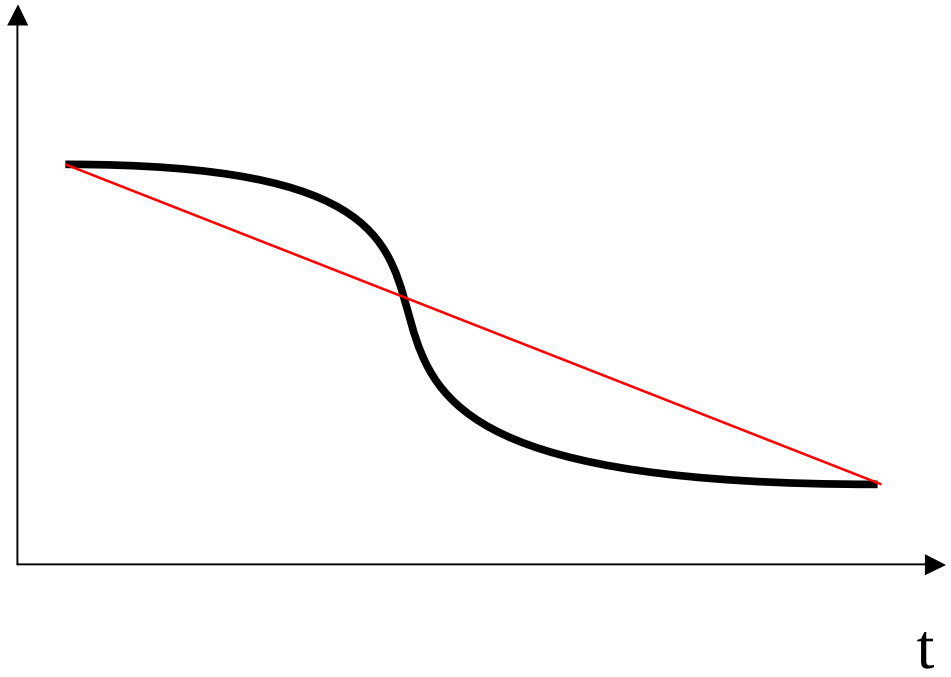
FIGURE 5. Wally B.'s zip off shows use of squash and stretch, anticipation, follow through, overlapping action, and secondary action.

Straight-ahead vs. pose-to-pose vs. blocking

- Straight ahead: proceed from frame to frame without planning where you want to be in ten frames. Can be wild, spontaneous.
- Pose-to-pose: Define keyframes and “inbetweens”.
- Blocking: computer graphics animators adaptation:
  - Start key – framing at the top of the hierarchy
  - Refine level by level
  - Keyframes for different parts need not happen at the same time.

Slow in, slow out

- An extreme pose can be emphasized by slowing down as you get to it (and as you leave it)



Exaggeration

Get to the heart of the idea and emphasize it so the audience can see it.

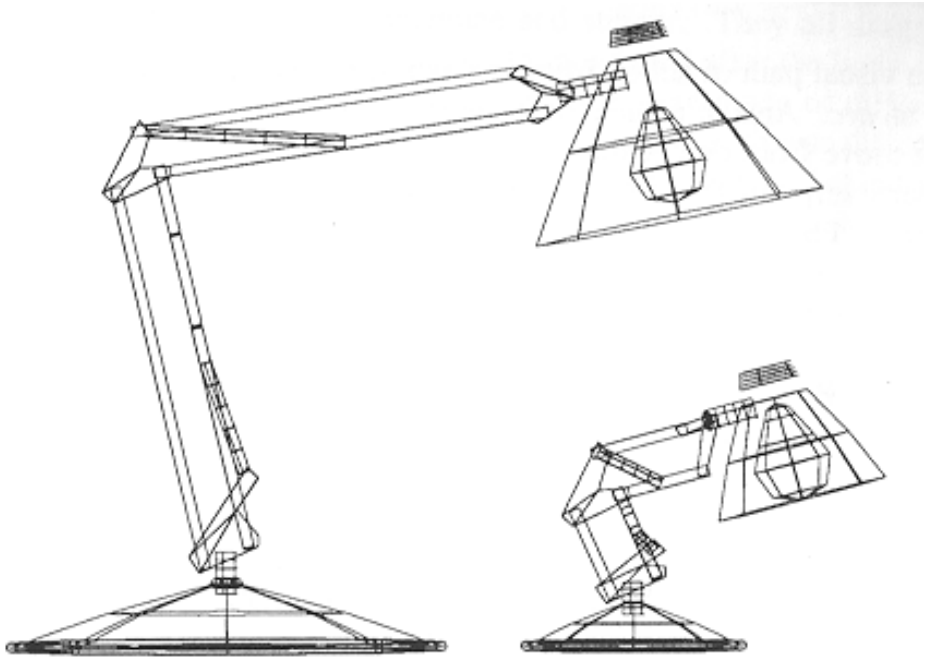


FIGURE 11. Varying the scale of different parts of Dad created the child-like proportions of Luxo Jr.

Appeal

- The character must interest the viewer.
- It doesn’t have to be cute and cuddly.
- Design, simplicity, behavior all affect appeal.
- Note: avoid perfect symmetries
- Example: Luxo, Jr. is made to appear childlike

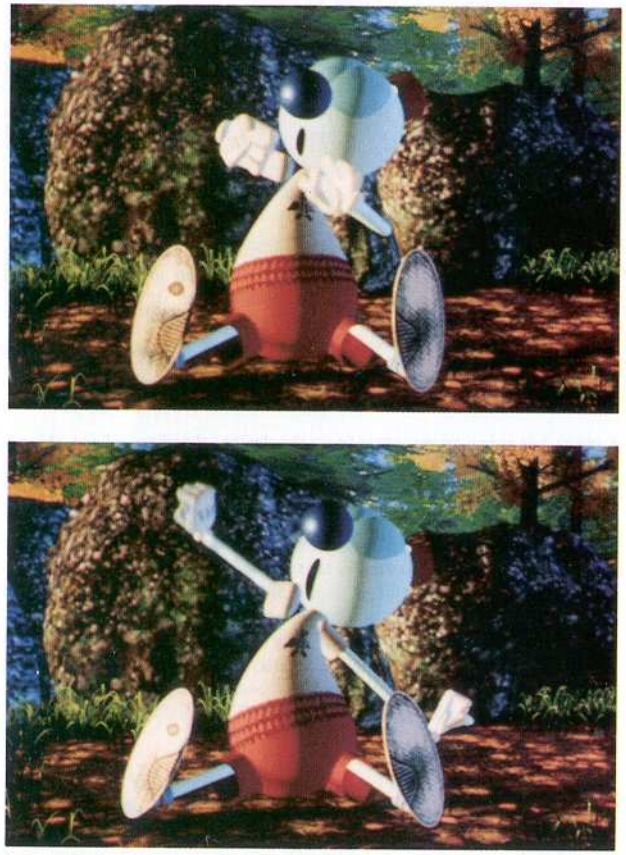


FIGURE 12. Andre's yawn was made more interesting by not duplicating the poses and the action from one side of his body to the other.