Character Animation

Based on “Principles of Traditional Animation Applied to 3D Computer Animation”, John Lasseter, SIGGRAPH 1987

Three Little Pigs – 1933 © Walt Disney

Snow White & the Seven Dwarfs – 1937 © Walt Disney
Disney Animators

- Sent to special drawing classes to get past standard cartoon formulas.
- Studied models in motion and live films.
- Studied actions over and over.

- The analysis of action became important to the development of animation.

Fundamental Principles

- Squash and Stretch
- Timing
- Anticipation
- Staging
- Follow Through
- Pose-to-Pose
- Slow In / Out
- Arcs
- Exaggeration
- Secondary Action
- Appeal
Squash and Stretch

- Movement changes object’s shape.
- The amount defines rigidity.
- Must preserve volume.
- On a face, it connects different parts.

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Timing

- Speed of action gives meaning to motion.
- Defines weight and/or intent of actor.
- Realistic behavior more important than looks.
Timing: Effect of Longer Action

Character turns his head and raises the chin slightly. How does the number of frames influence interpretation?

- ...has been hit by a tremendous force.
- ...has been hit by a rolling pin.
- ...has a nervous tic or a spasm.
- ...is dodging a rolling pin.
- ...is giving a crisp order “Move!”
- ...is more friendly “Over here”.
- ...sees a nice car.
- ...tries to take a look at something.
- ...searches for butter in fridge.
- ...appraises thoughtfully.
- ...stretches a sore muscle.

Anticipation

- An action occurs in three parts:
  - Preparation
  - Action proper
  - Termination  Follow-Through
- Anticipation provides:
  - Natural anatomy
  - Device to catch audience’s eye (will they see it?)
  - Direction of attention

Staging

- Present an idea so it is unmistakably clear.
- One idea seen at a time.
- Object of interest should contrast with scene.

"Look at this, now look at this, then look at this..."
Follow-Through

- Action *seldom* terminates with a sudden stop.
- They often *carry past termination* point.
- Lead part *initiates* motion, other parts follow.
- Lead part stops, other parts stop later.
- E.g. the eyes *lead the head*.
- Sequences of actions should *overlap*. 
Pose-to-Pose

• The method of creating frames:
  – "Straight-ahead" let’s animator do one drawing after another from a starting point
    • Slightly zany look for scrambling actions
  – "Pose-to-Pose" let’s animator first pose character into key poses and then fill in between.
• Digital animation mostly done “Pose-to-Pose” through hierarchical posing of limbs.

Slow In / Out

• More time spent at the beginning and at the end of an action.
• Initially done because animators wanted audiences to see the action better.
• Achieved expressive “spinted results”.

Slow In / Out
Arcs

- Action paths are always arcs.
- Achieved with splines.

Exaggeration

- Make the essence of an idea bigger.
- Provide a "ground" for comparison in scene.

If he is angry, make him furious.

Ralph A. De Stefano

Secondary Action

- New actions can result from an action.
- Can be subtle effects [e.g. Luxor's cord]
- Might still need staging or it gets lost.
Appeal

- Live action actors have charisma.
- Animated characters have appeal.
- Avoid "sameness" and "stiffness".

3D Animation Basics

Skeletal Rigging