# Reading

- *Principles of Traditional Animation Applied to 3D Computer Animation,* by John Lasseter, ACM SIGGRAPH 1987

# Principles of Traditional Animation

- **Squash and Stretch** - defining the rigidity and mass of an object by distorting its shape during an action
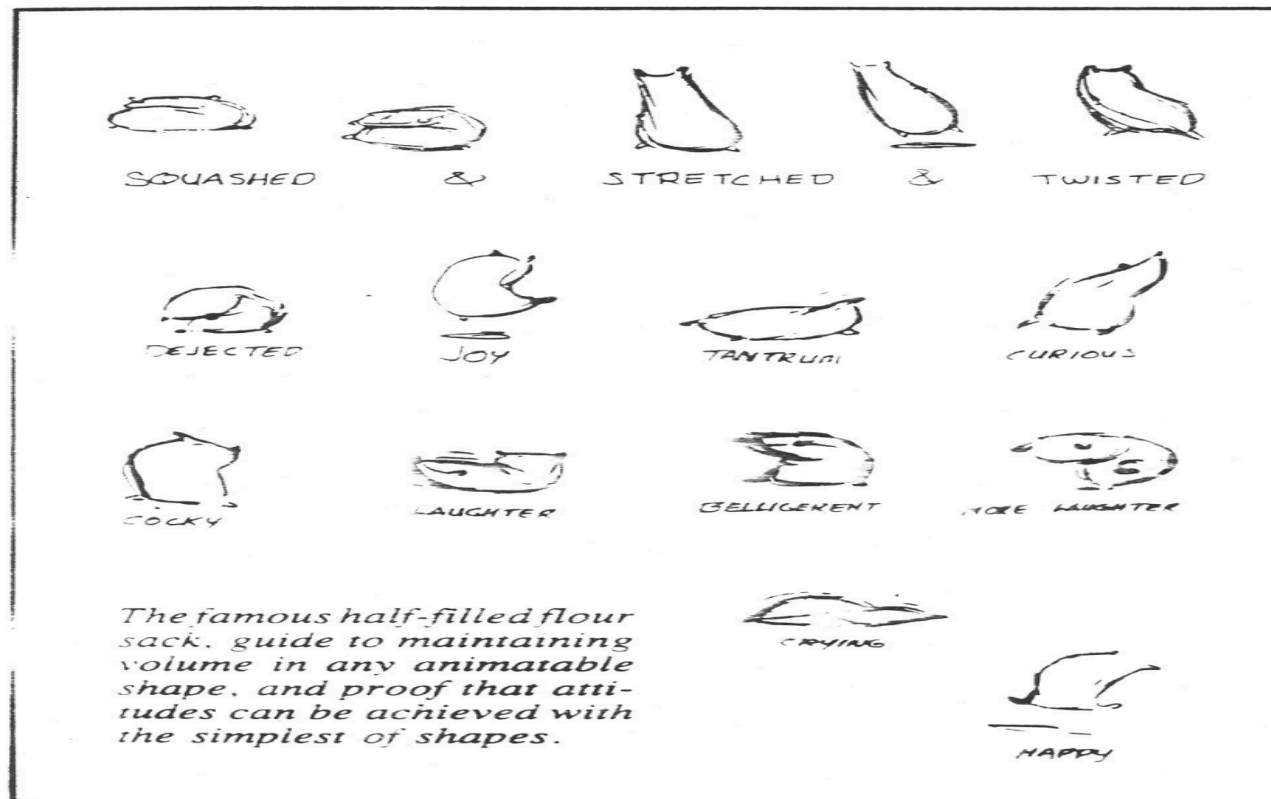


Figure 1. Constant volume and attitude of a half-filled flour sack [1].

M. C. Lin

# Principles of Traditional Animation

- <u>Squash and Stretch</u> - defining the rigidity and mass of an object by distorting its shape during an action
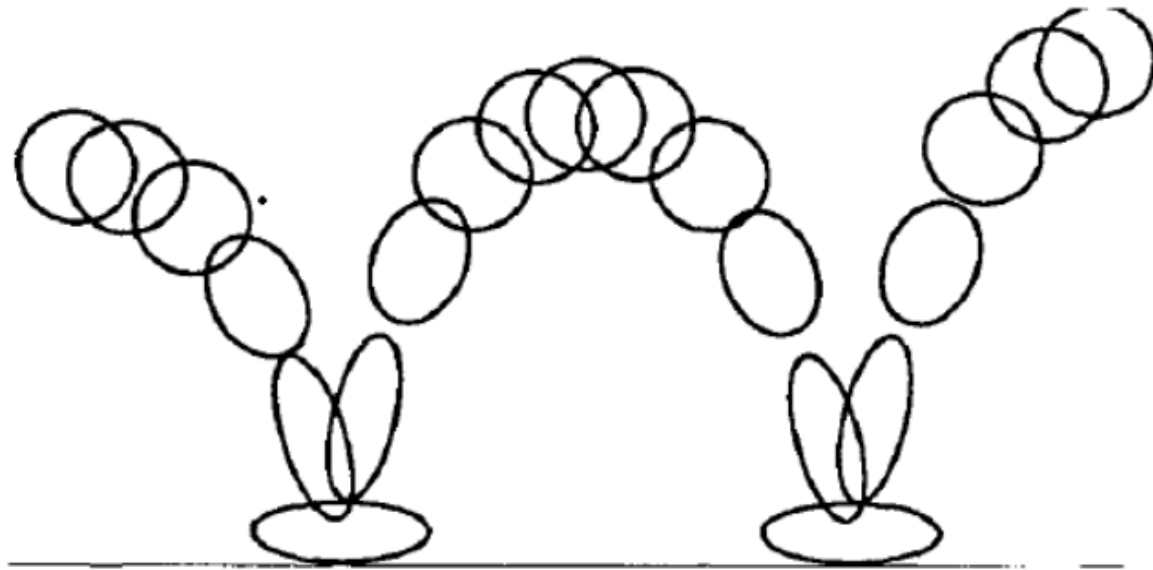


**Figure 2.** Squash and stretch in bouncing ball [2].

# Principles of Traditional Animation

- **<u>Anticipation</u>** - the preparation for an action.  For example
  - Retractinga foot before kicking a ball.
  - Attract the viewer's attention to prep for the next event, e.g., raising the arms and staring at something before
  - Create the perception of weight or mass, e.g., a heavyperson might lean back before to stand up

# Principles of Traditional Animation

- **<u>Staging</u>** - presenting an idea so that it is unmistakably clear
  - Lead the viewer's eye to where actions will occur
  - Main object should be contrasted in some way with the rest of the scene

# Principles of Traditional Animation

- **Straight Ahead Action -** animator works literally straight ahead from the first drawing getting new ideas while proceeding, having no planand knowing only the "story point".

  - very creative and good for wild, spontaneous actions, but weak if there is the strong perspective in layout or a background must be matched

- **Pose-to-Pose Action**

# Principles of Traditional Animation

- **Straight Ahead Action**

- **Pose-to-Pose Action** first thinks about the story and what drawings and poses may be needed to tell it. makes key drawings of the poses ("extremes"), relates them to each other in size and action. Drawings added in between key drawings are "inbetweens".
  - Good for animation requiring good acting
  - Can appear tedious and predictable

# Principles of Traditional Animation

- **Timing and Motion** - spacing actions to define weights & sizes of objects and the personality of characters

  - affect perception of physical properties of an object.  E.g. heavier/bigger harder and longer to accelerate and decelerate, by varying the spaces/number of frames
  - Indicates an emotional state.

# Principles of Traditional Animation

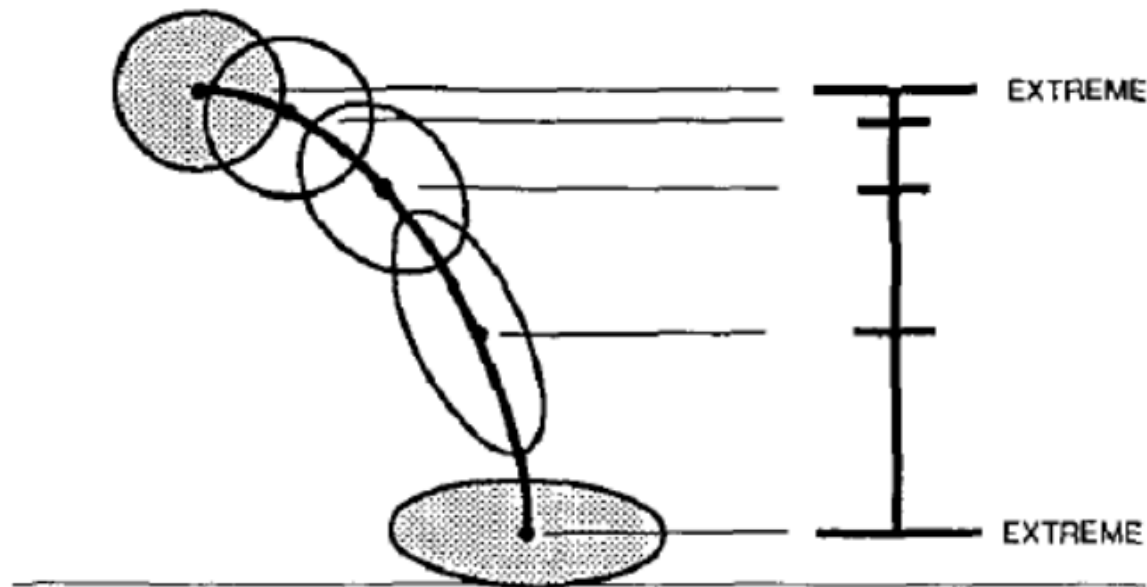- **Slow In and Out** - the spacing of the in-between frames to achieve subtlety of timing and movement



**Figure 3.** Timing chart for ball bounce [2].

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# Principles of Traditional Animation

- **<u>Follow Through and Overlapping Action</u>** - the termination of an action and establishing its relationship to the next action
  - Real-world actions rarely terminate abruptly, so the affected objects/parts are to be 'moved' and 'continued' to be animated
  - Also provide character personalities

# Principles of Traditional Animation

- **Arcs** - the visual path of action for natural movement

  - Make actions smoother and less stiff
  - E.g. use of splines – needing to check for collision with surfaces

M. C. Lin

# Principles of Traditional Animation

- **<span style="color:orange">Exaggeration</span>** - **Accentuating the essence of an idea via the design and the action**
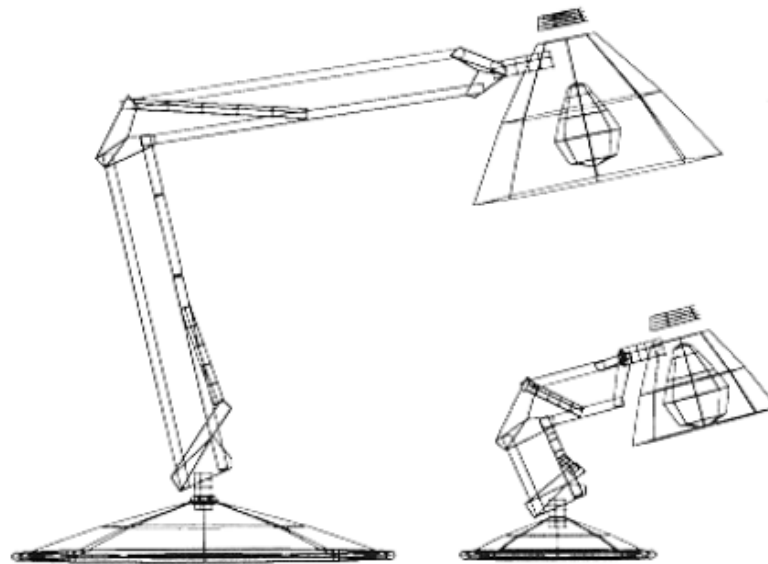


Varying the scale of parts of Dad created a child-like Luxo Jr.

# Principles of Traditional Animation

- <u>Secondary Action</u> - the action of an object resulting from another action. E.g.
  - Motion of the cord of Luxo Jr.
  - Movement of cloth and hairs
  - Facial animation of a character

# Principles of Traditional Animation

- <u>Appeal</u> - creating a design or an action that the audience enjoys watching
  - Avoid mirror symmetry for naturalness Directing the eyes with smiles (lips)
  - Fleshy cheeks are squashed with softness appearance