



KEYFRAMING & MAYA

A classification of methods

- * Magnenat-Thalmann & Thalmann, 1991
- * A computer animation sequence may be defined as a set of objects characterised by **state variables which evolve over time.**
- * By the nature of information for the motion control methods can be:
 - * Geometric
 - * Physical
 - * Behavioral

A classification of methods

* Geometric

- * performance animation, shape transformation, parametric keyframe animation.
- * animated objects are locally controlled.

* Physical

- * dynamic simulation, functional methods based on biomechanics.
- * actor motions are globally controlled (solving equations of motion).

* Behavioral

- * take into account the relationship between each object and the other shapes.
- * animated objects are considered as autonomous agents.

Geometric-based methods

- * Geometric and keyframing methods

- * specify motion in terms of coordinates, angles, other shape characteristics, velocities or accelerations.

- No Forces!

- * Keyframing.

- * Morphing.

- * Inverse Kinematics.

- * Procedural animation.

- * Deformable meshes.

Geometric-based methods

- * Motion Capture and Performance-based animation
 - * mapping of measurements into the motion of virtual agents.
 - * mechanical, magnetic, optic mocap systems.
- * Keyframing interpolation.

Physics-based methods

- * Dynamic simulations
 - * non-constrained methods.
 - * constrained methods.
 - * forward dynamics.
 - * inverse dynamics.
- * Physics-based deformations.

Behavioral animation

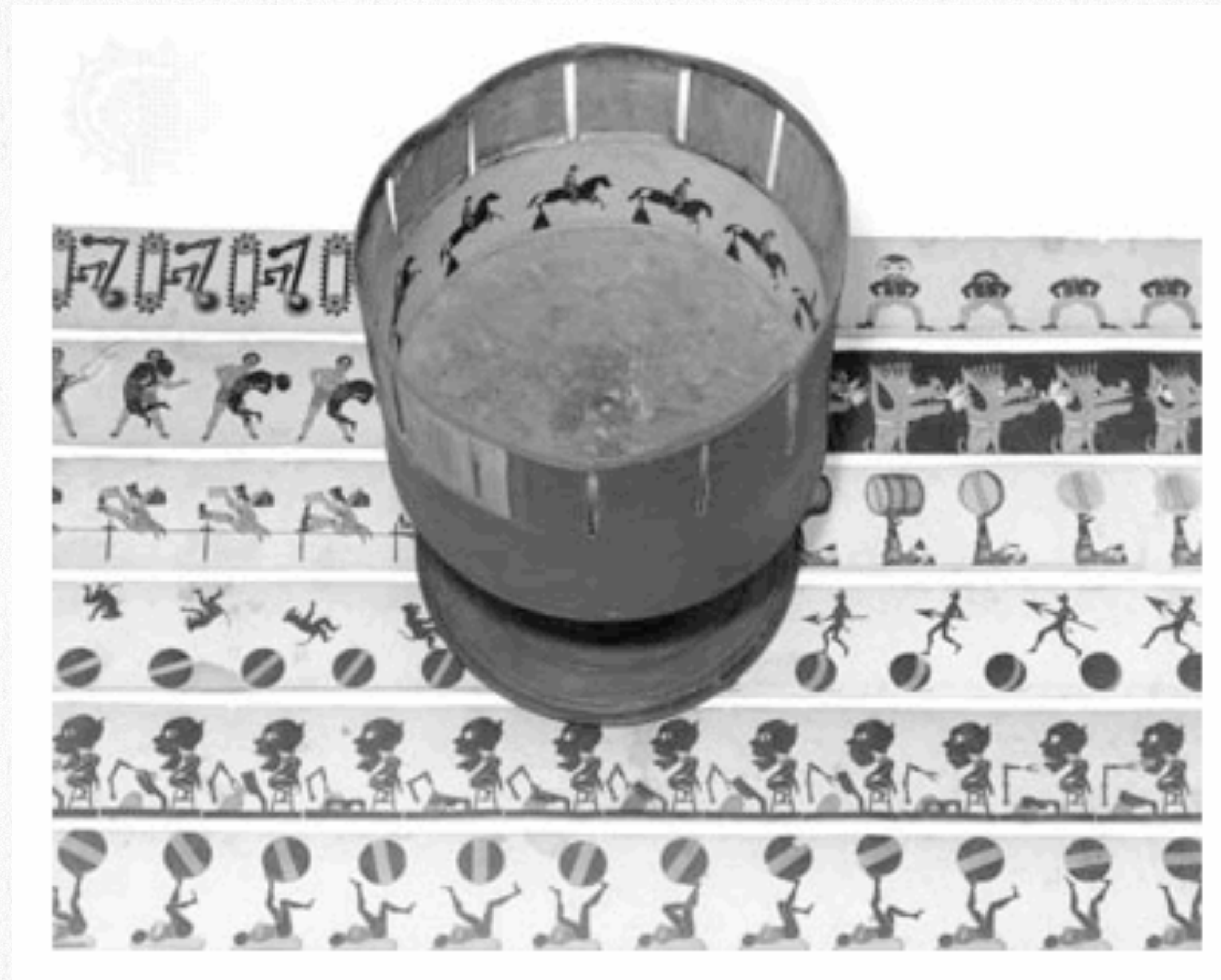
- * Task-based animation

- * Grasping task.

- * Locomotion task.

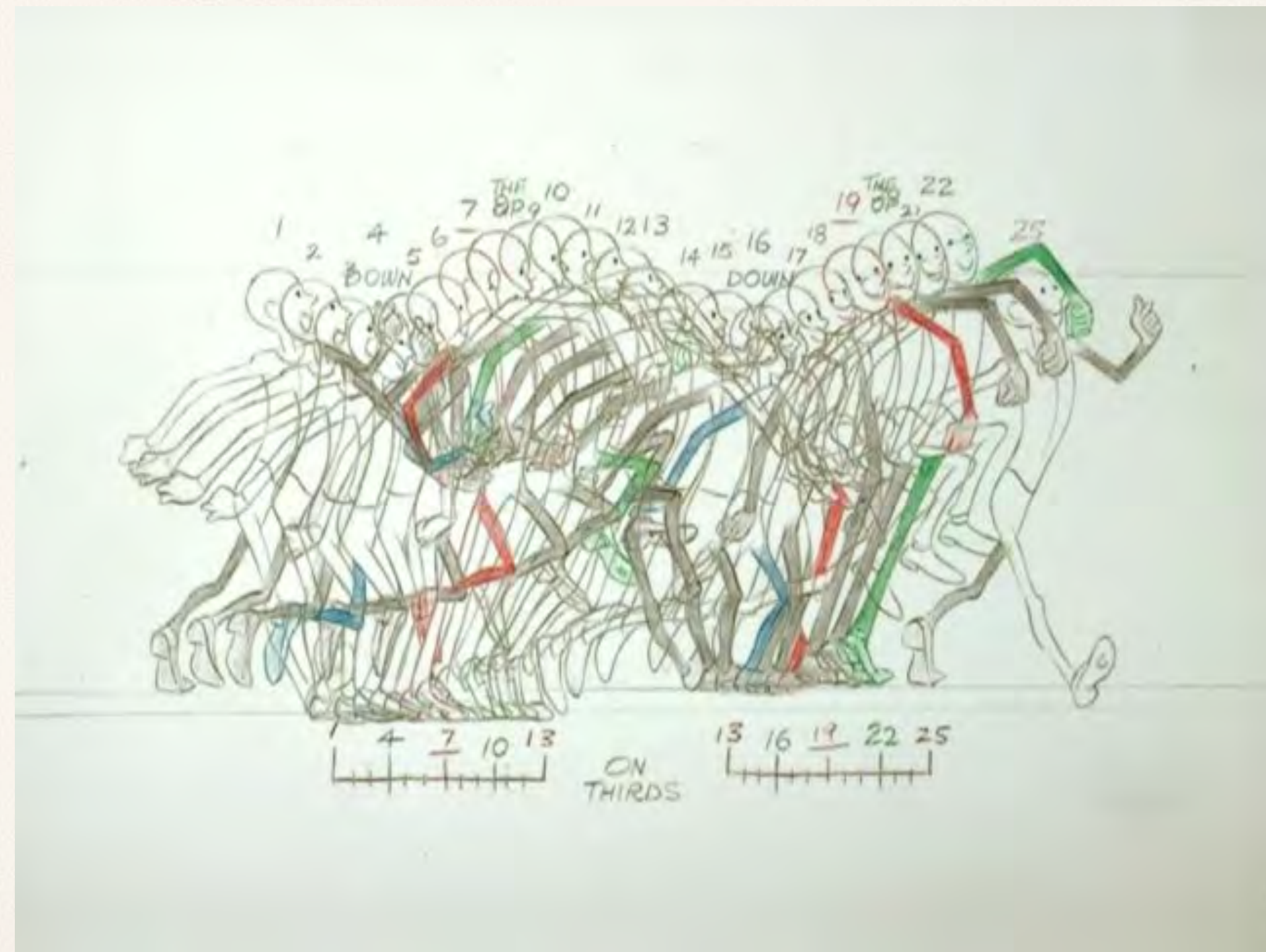
- * Path finding and following tasks.

Keyframing animation



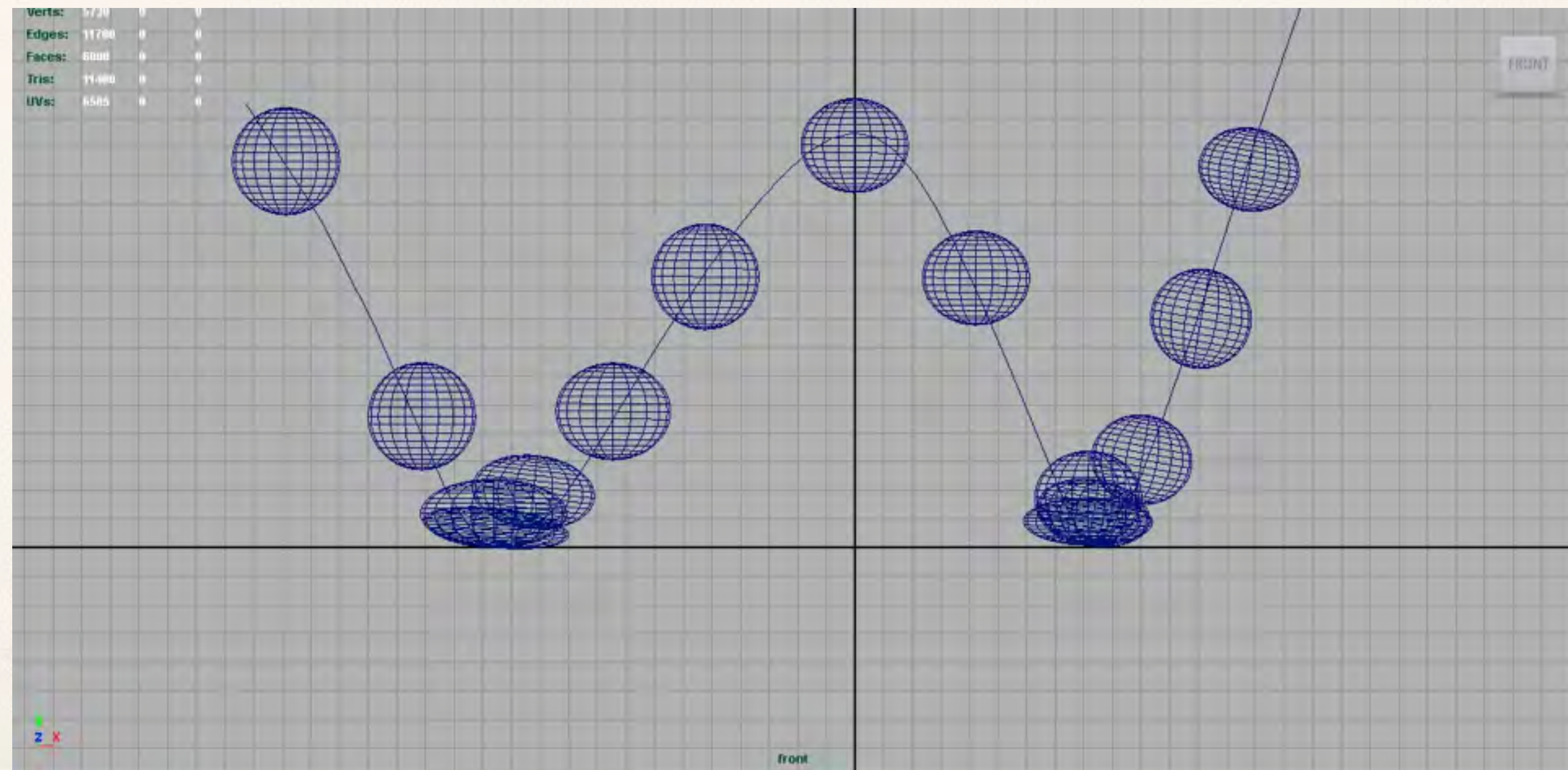
Traditional 2D animation

- Highly skilled animator draws keyframes.
- Less skilled (lower paid) animator draws the in-betweens.
- Time consuming process.
- Difficult to create physically realistic animation.



3D Keyframing animation

- Animators specify important keyframes in 3D.
- Computer generates the in-betweens.
- Simulation can be done for hair, clothes, etc.
- Still time consuming ... Pixar films take about four years in production.



Keyframing general pipeline

- Script
- Storyboard
- Soundtrack
- Layout
- Correlate the layout with the soundtrack
- Keyframes
- In-betweens
- Trial film (pencil test)
- Painting (redraw onto a clear sheet of plastic called a cel)
- Assemble cels into a sequence and film them.



<http://www-inst.eecs.berkeley.edu/~cs194-8/Fall05/II/readings/F02.01/DesigningAPixarFilm.pdf>





ABC of Animation - Cirkus (Electronic Theater, SIGGRAPH 2011)