Techniques for Creating Animation
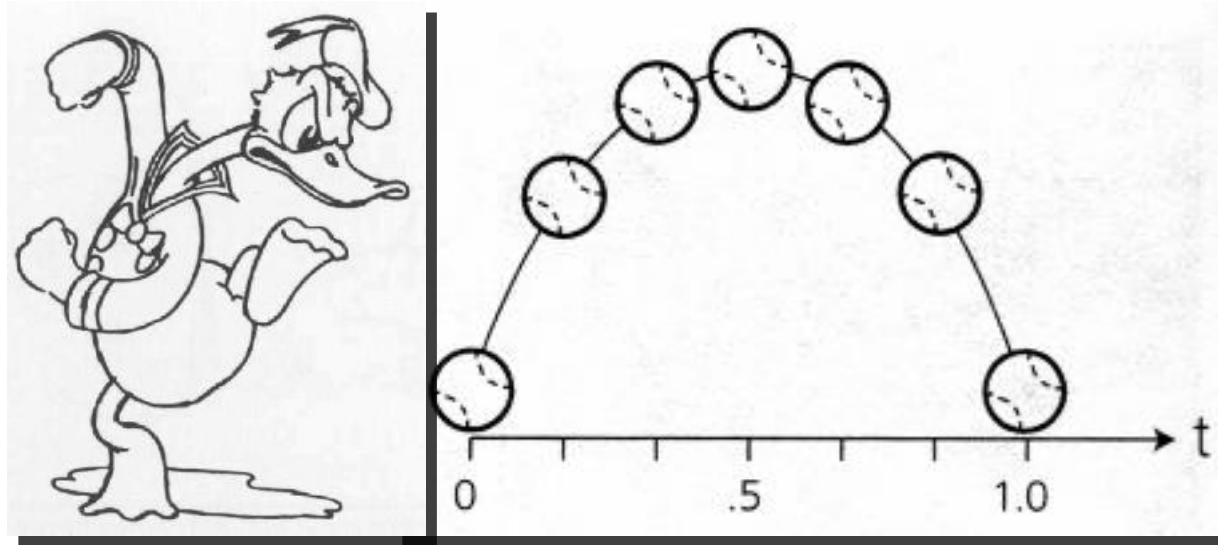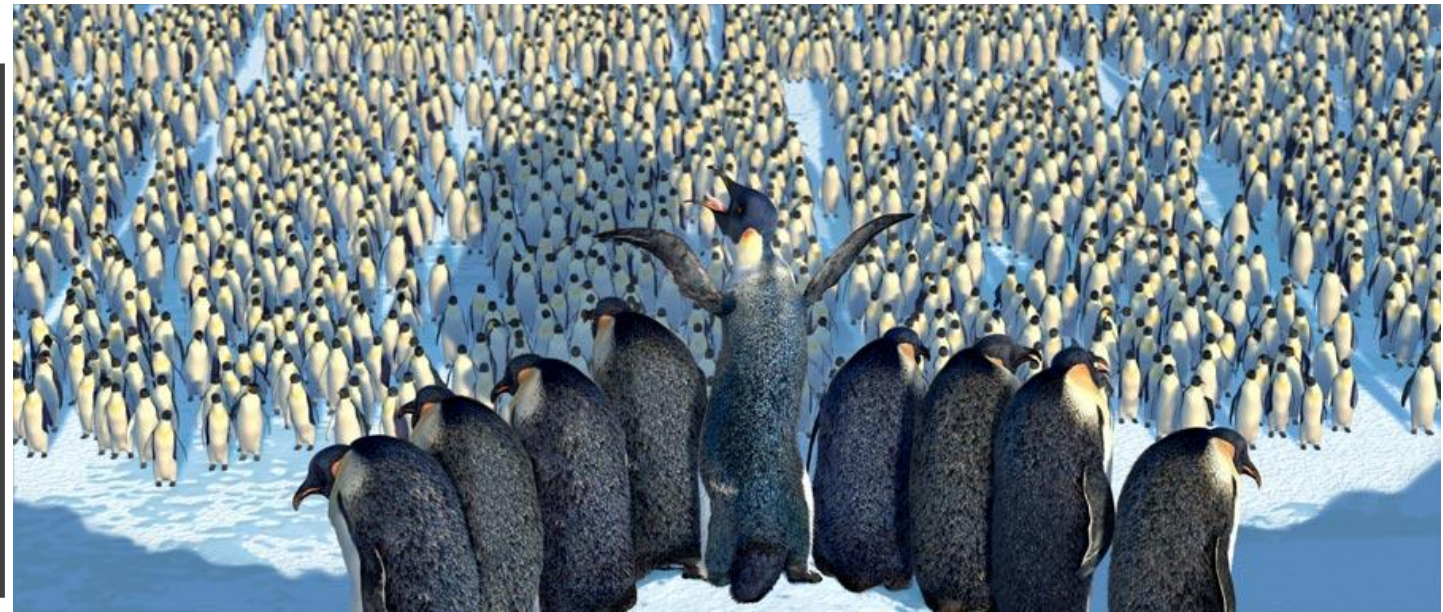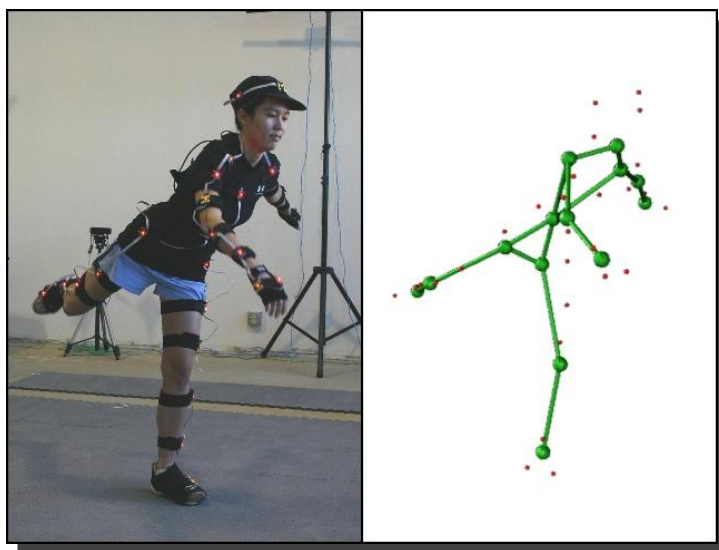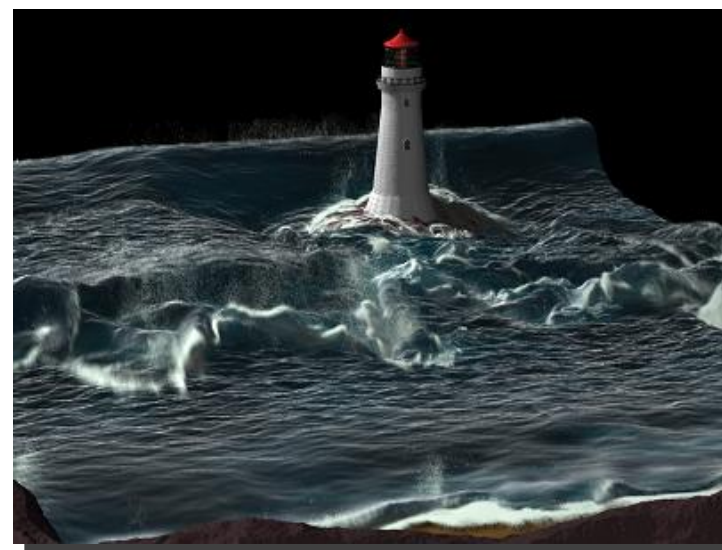

Keyframing

Procedural Animation

Data-driven Animation
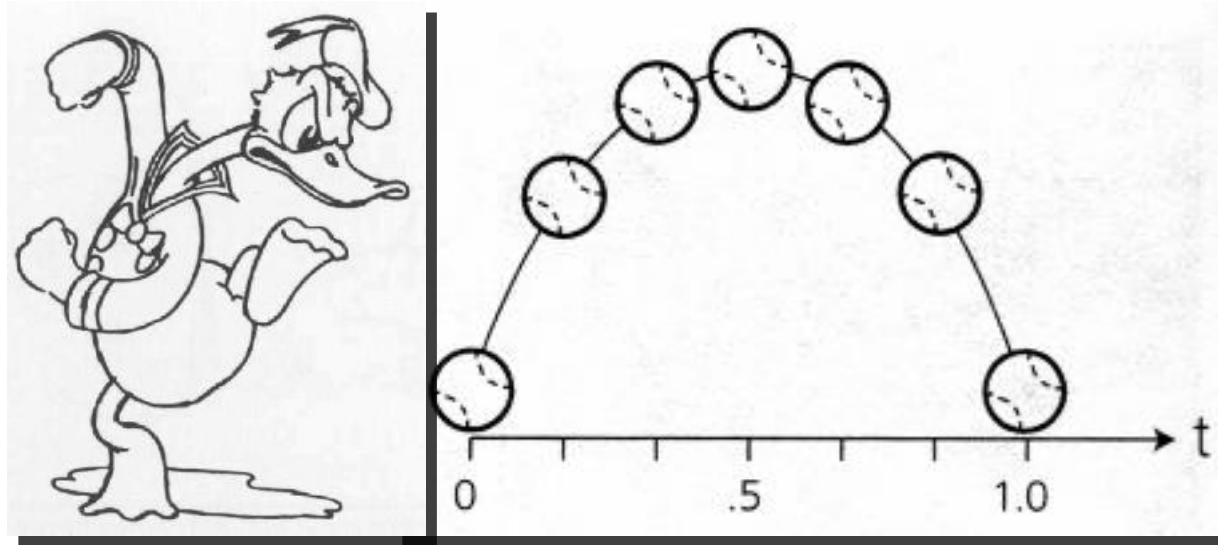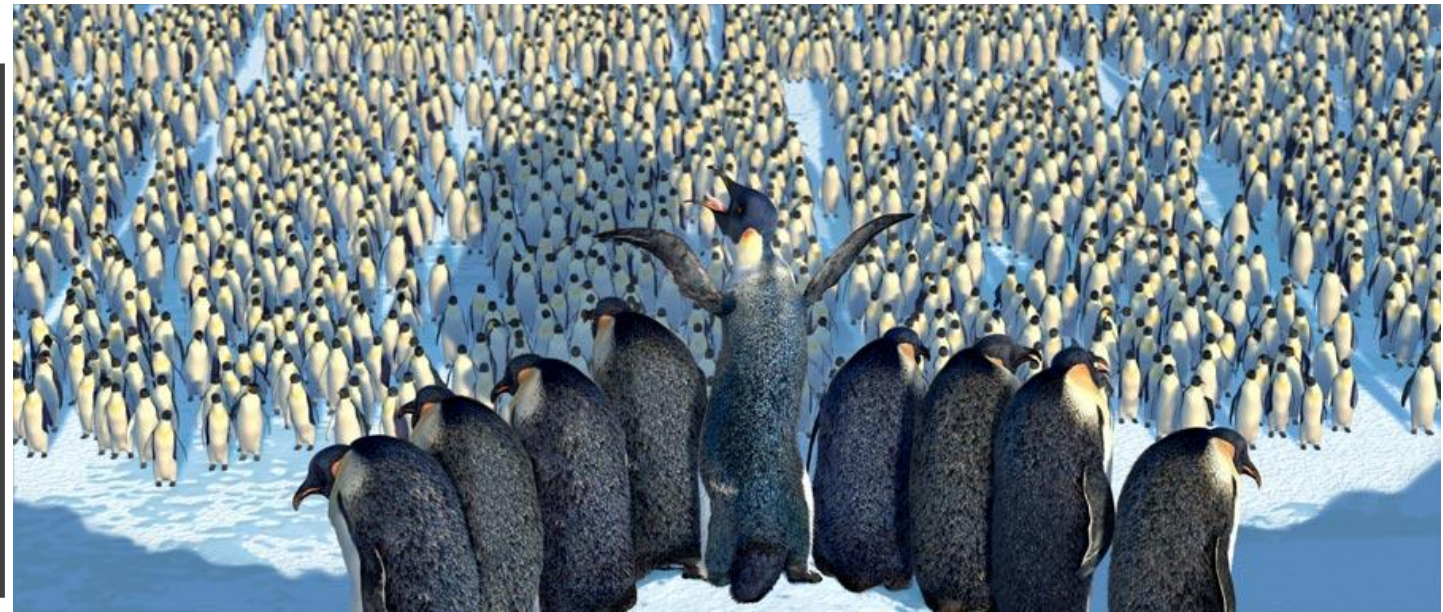

Physical Simulation

Reminder

Send me your 5 paper selections by Wednesday!

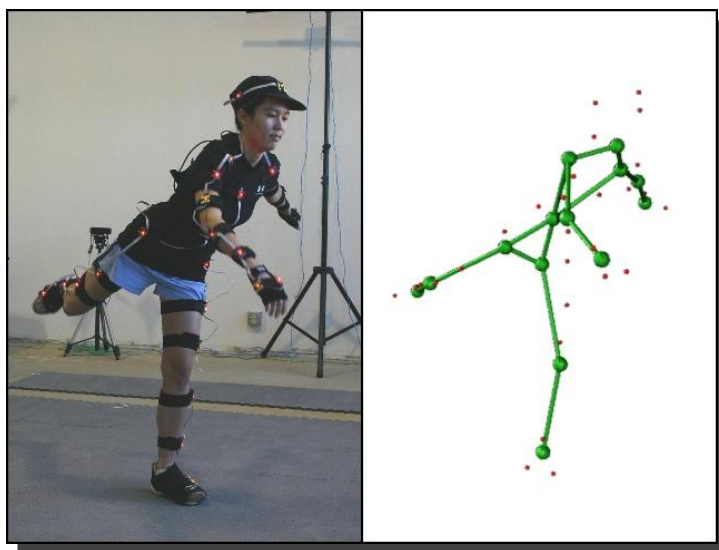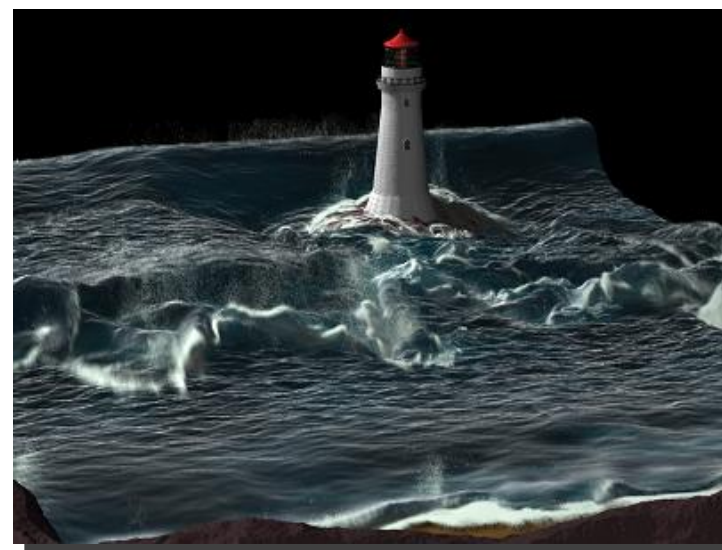# Techniques for Creating Animation

Keyframing

Procedural Animation

Data-driven Animation

Physical Simulation

"Traditional" Animation?

Principles of Traditional Animation
[Lasseter, SIGGRAPH 1987]

- Stylistic conventions followed by Disney's animators and others

- From experience built up over many years
  - Squash and stretch -- use distortions to convey flexibility
  - Timing -- speed conveys mass, personality
  - Anticipation -- prepare the audience for an action
  - Followthrough and overlapping action -- continuity with next action
  - Slow in and out -- speed of transitions conveys subtleties
  - Arcs -- motion is usually curved
  - Exaggeration -- emphasize emotional content
  - Secondary Action -- motion occurring as a consequence
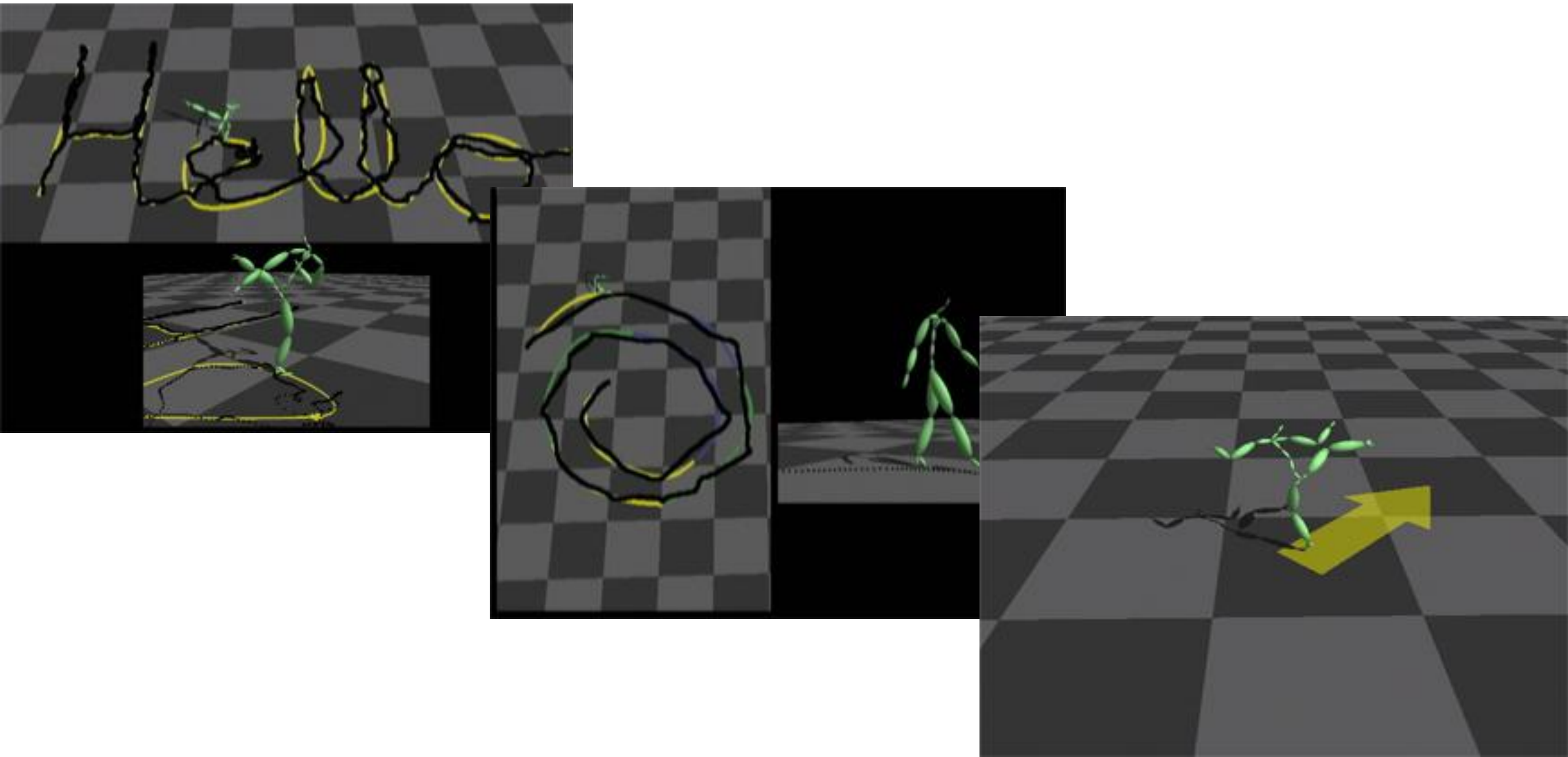 - Appeal -- audience must enjoy watching it

Procedural Animation

Data-driven Animation
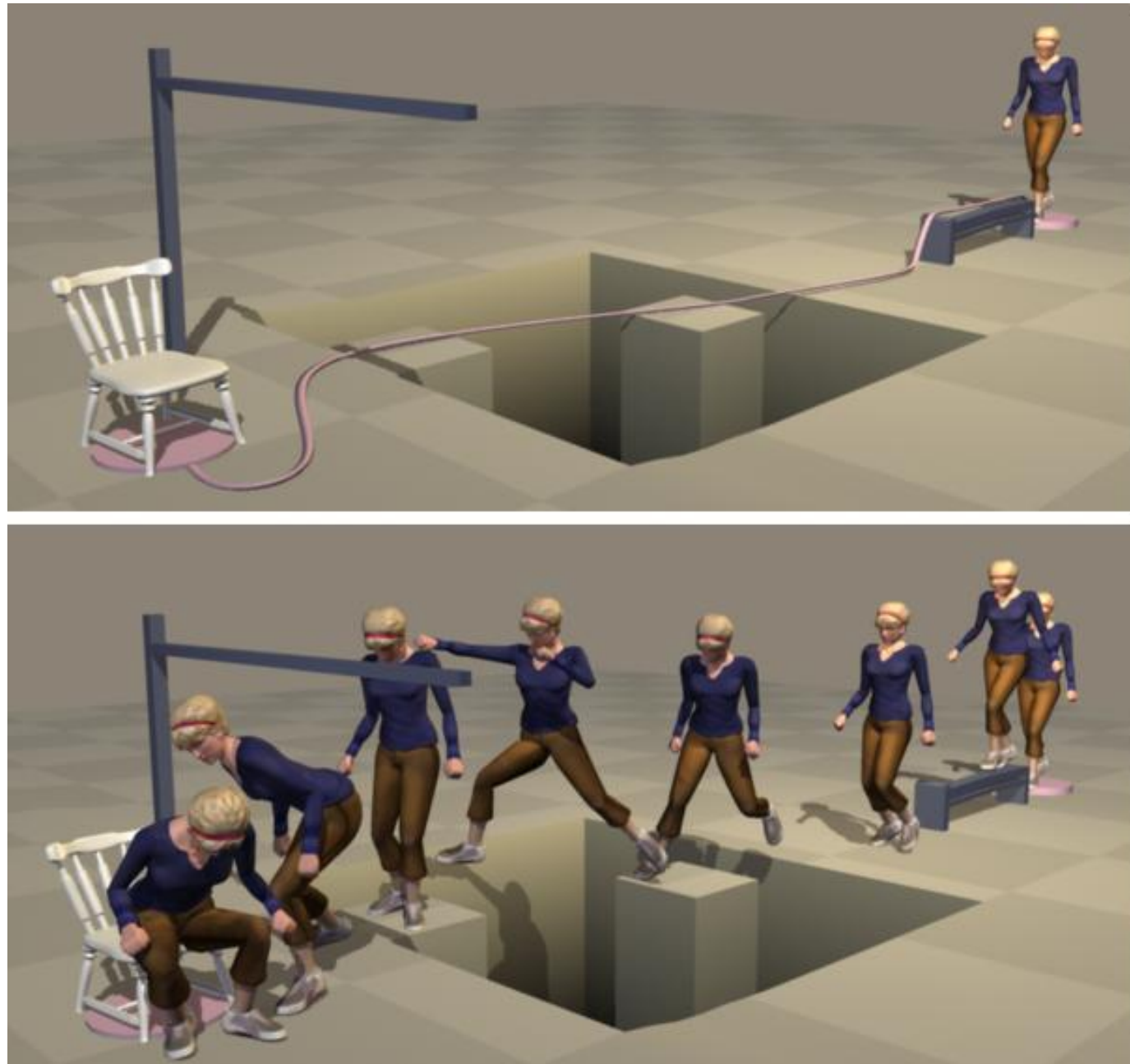
Lab Demo next Monday
meet in WeH 1334

Motion Graphs Videos
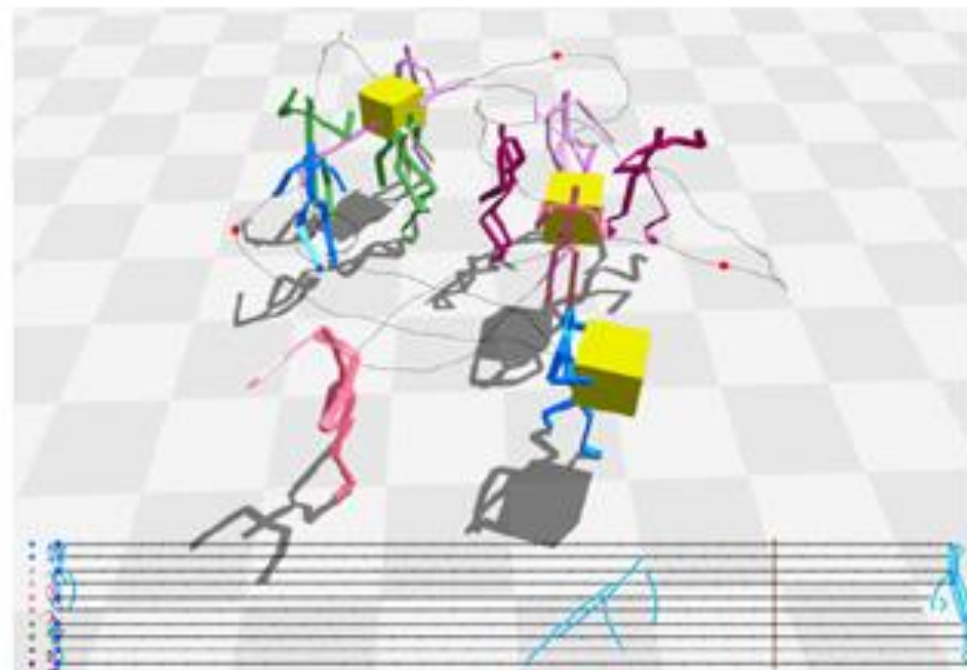
Lucas Kovar (U. Wisconsin / ILM)
with Michael Gleicher

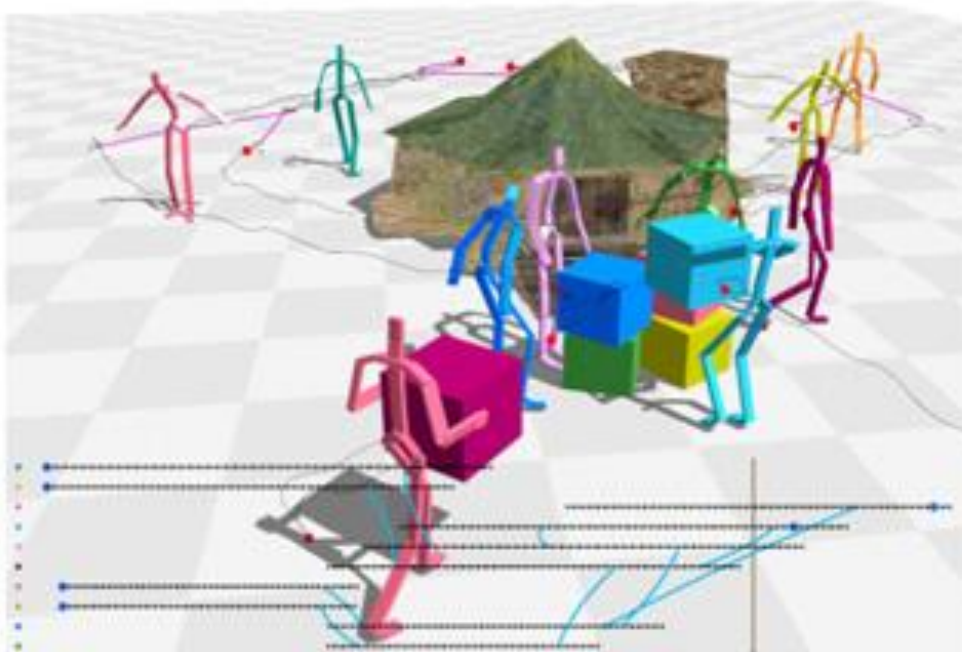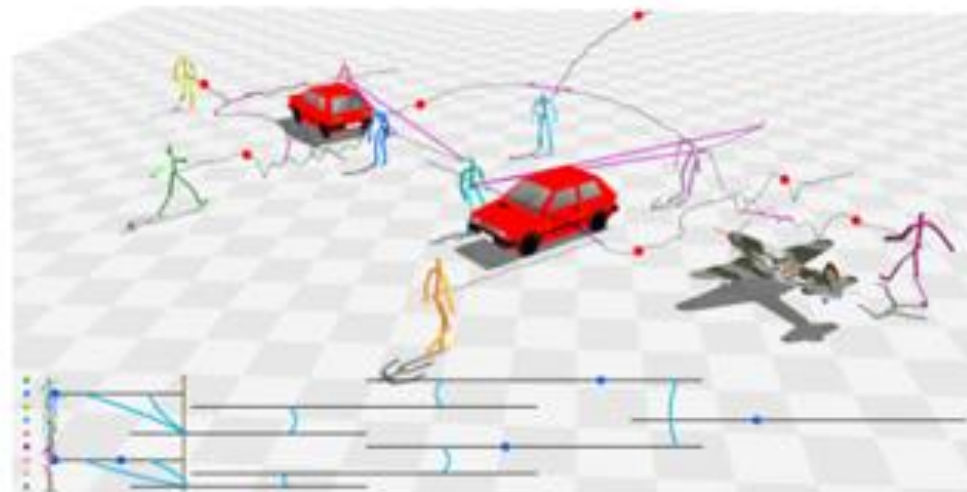# Interpolated Motion Graphs

http://www.seas.upenn.edu/~alla/
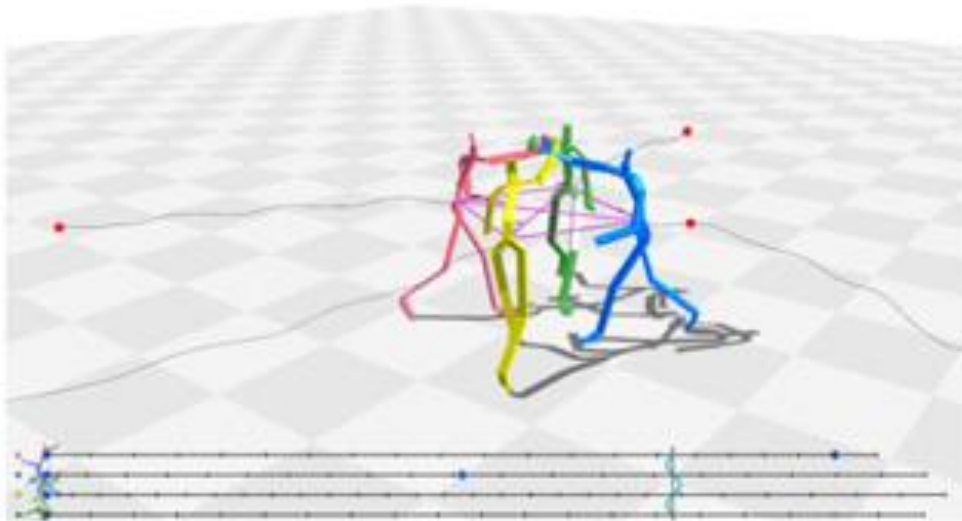
Alla Safonova (CMU / U. Pennsylvania)
with Jessica Hodgins

Interactive Editing

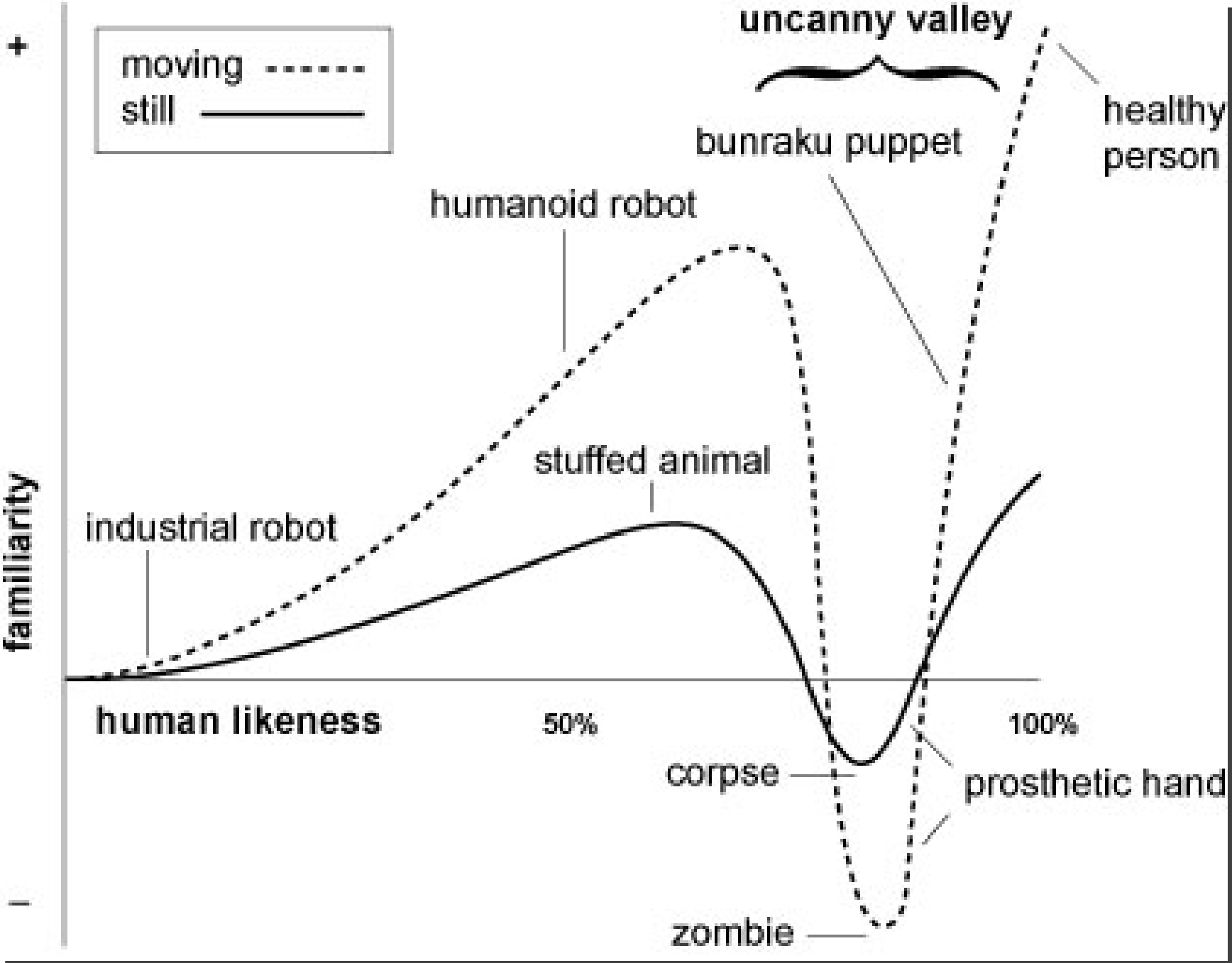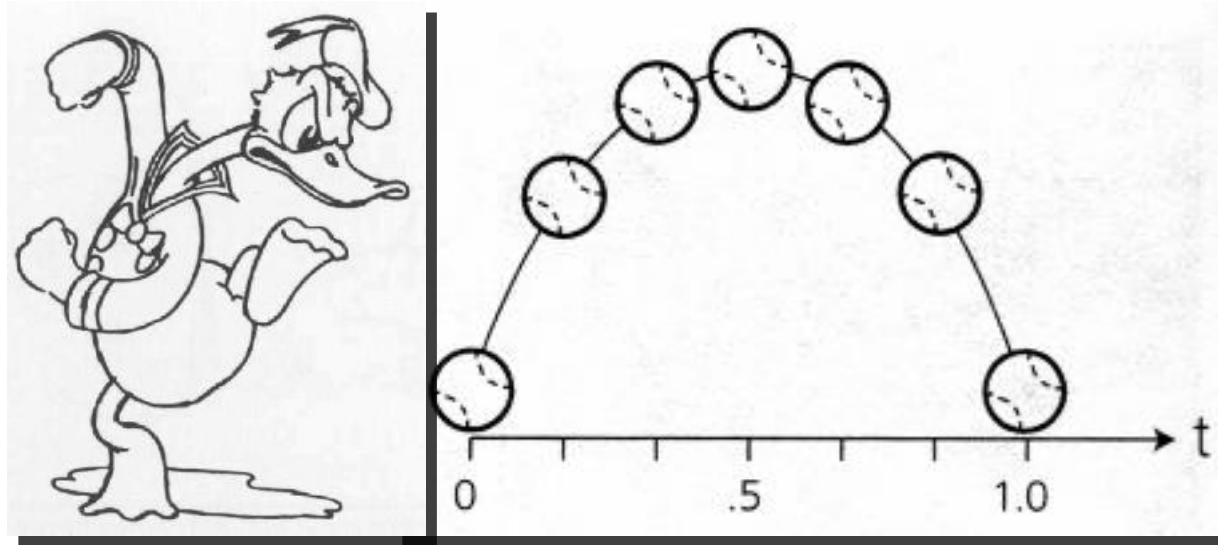Jehee Lee (Seoul National University)

Uncanny Valley

Match Character Geometry to Animation Capabilities

Techniques for Creating Animation

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Physics-based Animation
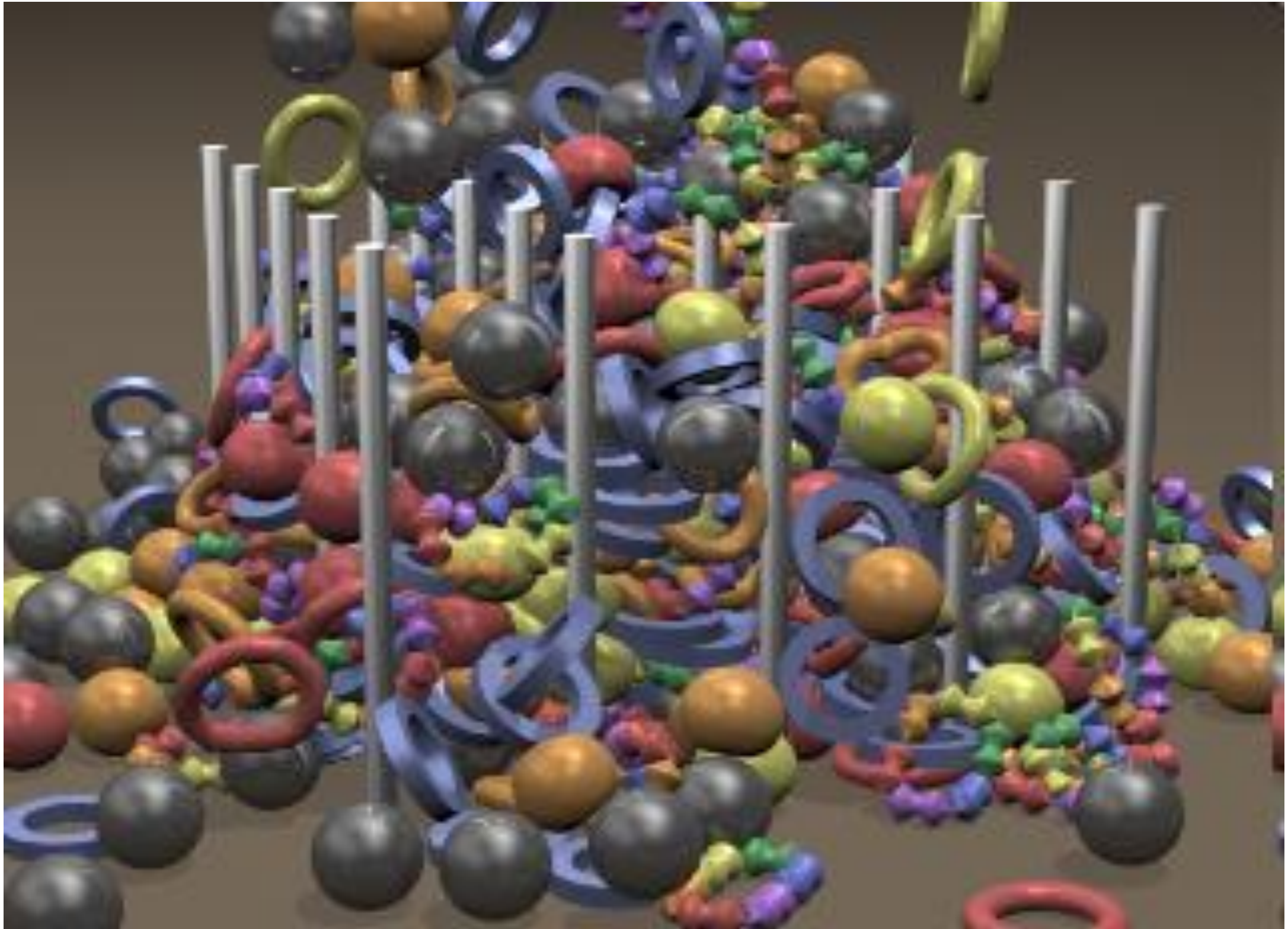
Now for some details...

Keyframing: setup

Model and rig your character

http://web.alfredstate.edu/ciat/tutorials/SkeletonSetup.htm

Keyframing: setup

What is accomplished?

- Define joint locations and bone heirarchy using a point and click interface

- Define joint limits

- Set up Inverse Kinematics handles

- Bind skeleton to its "skin"

Preview / Review next Monday

Keyframing: animation

A basic walk cycle tutorial:

http://www.anticz.com/Walks.htm

Walk Cycle Variations

Working with Motion Capture is Quite Different...

http://mocap.cs.cmu.edu/
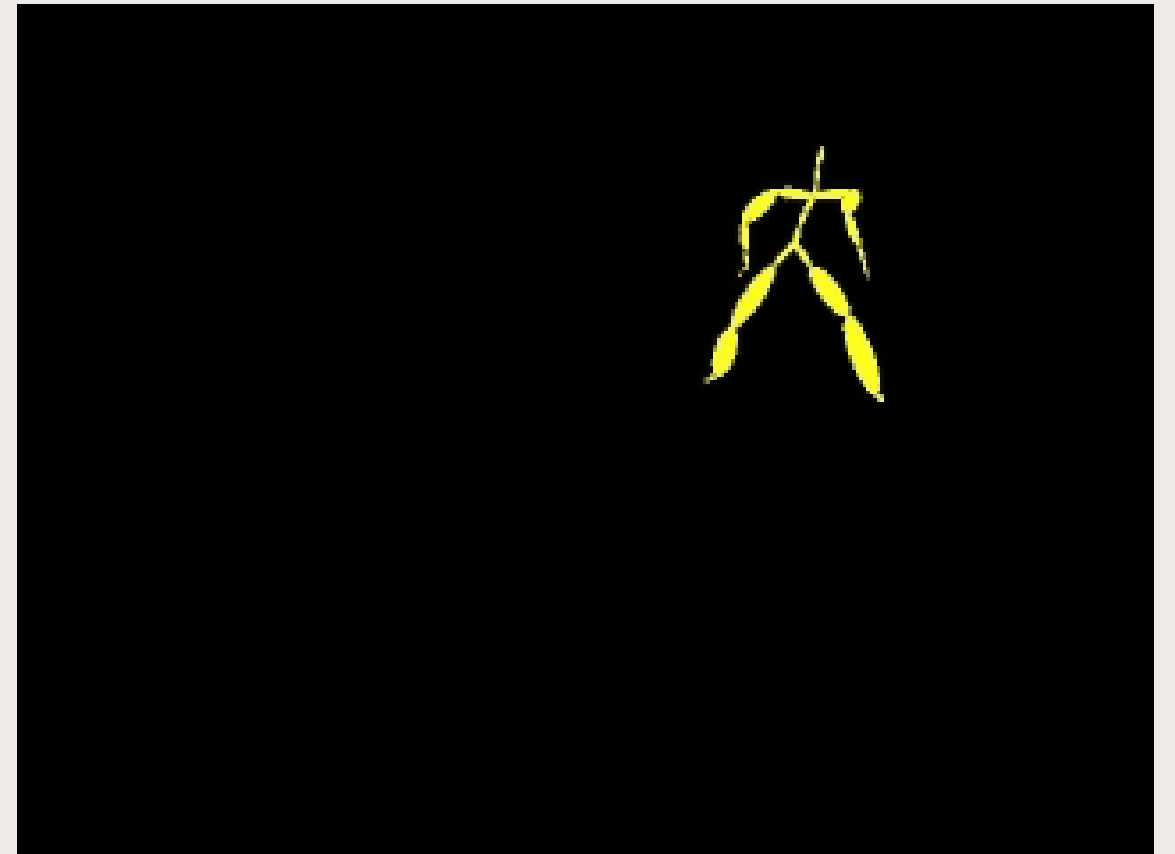
CMU Mocap Database

To define a motion, we need:

    The skeleton file: ASF format

    The motion file: AMC format

Let's look at these...

Editing Motion Capture Data

How might you edit motions in such a format?

Retiming

Displacement curves

Motion "filtering"
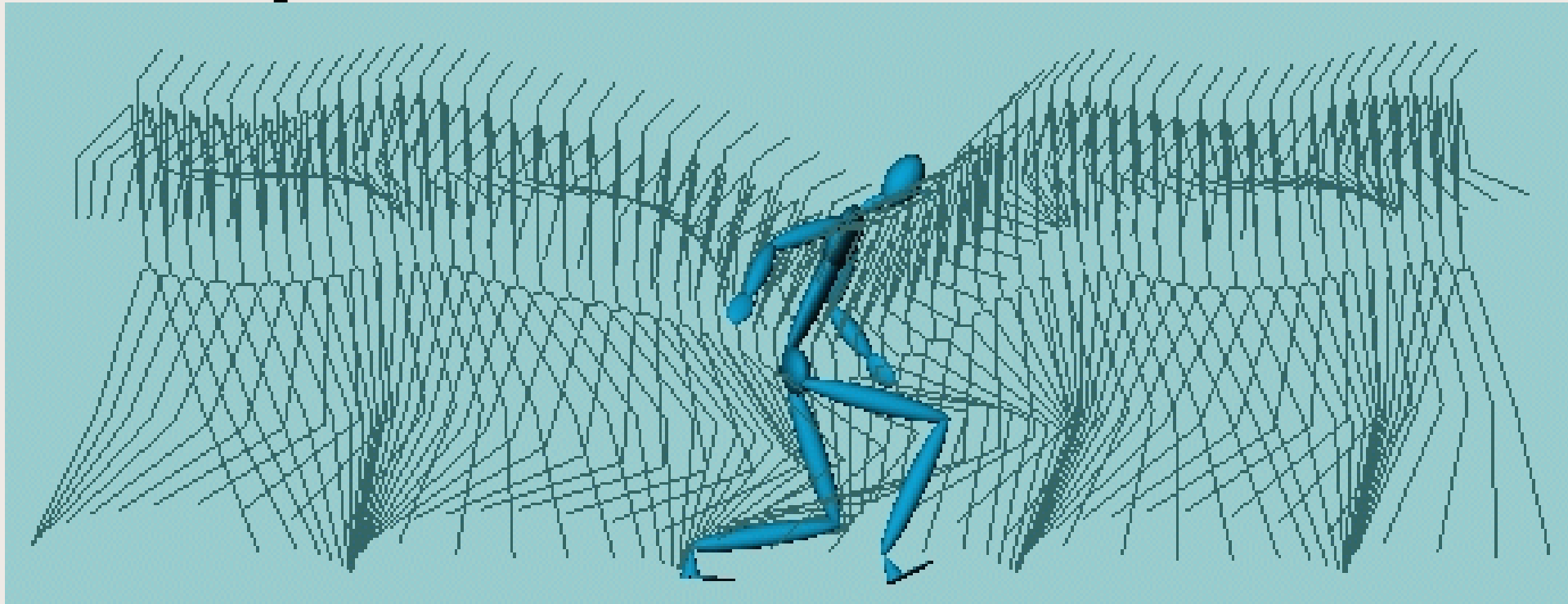
Keyframe extraction / edit keyframes

Retiming

System outline:
- Beat extraction
- Dynamics extraction (louds and softs)
- User script file determines motions
- System controls timing, dynamic range of movements
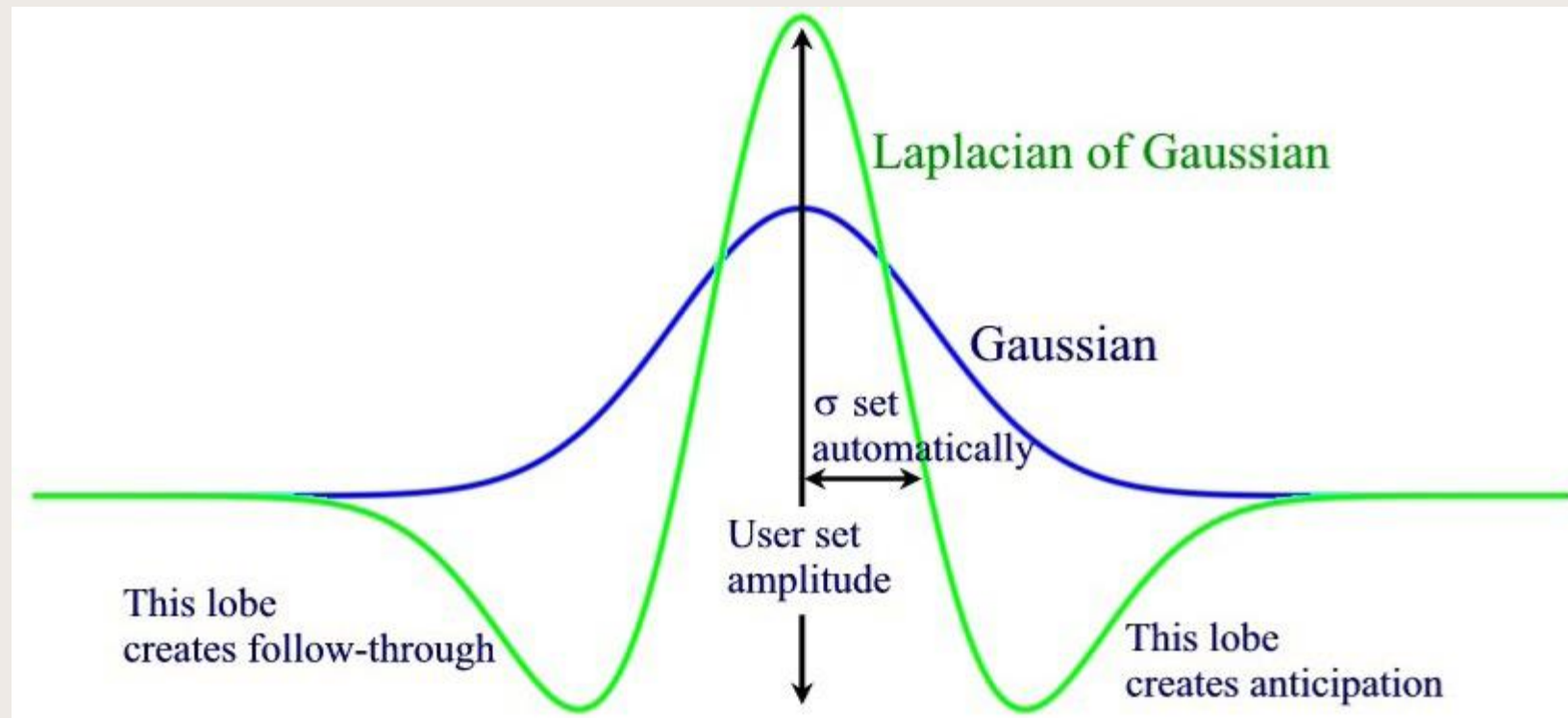
Displacement Curves

Main ideas:
- User edits → displacements to the original motion
- Displacements can be made at different resolutions in a hierarchical scheme

Jehee Lee and Sung Yong Shin, A Hierarchical Approach to Interactive Motion Editing for Human-like Characters, SIGGRAPH 99, 39-48, August 1999.

Motion Filtering

Laplacian of Gaussian

Gaussian

σ set automatically

User set amplitude

This lobe creates follow-through

This lobe creates anticipation

Main idea:

- A simple filter applied to a motion sequence can create squash and stretch effects and cartoon like exaggeration

The Cartoon Animation Filter
Jue Wang, Steve Drucker, Maneesh Agrawala, Michael Cohen
SIGGRAPH 2006, July 2006. pp. 1169-1173.

Keyframe Extraction

Main idea:

- Keyframes are local extrema of an embedding of the motion into a low-dimensional space

Jackie Assa, Yaron Caspi, and   Daniel Cohen-Or
Action Synopsis: Pose Selection and Illustration
SIGGRAPH 2005