

Keyframing vs. Motion Capture

Keyframing: setup

Character Designer

- **Define joint locations and bone heirarchy using a point and click interface**
- **Define joint limits**
- **Set up Inverse Kinematics handles (and other controls for the rig)**
- **Bind skeleton to its “skin”**

Keyframing: process

Character Animator

- **Use rig controls to set and adjust keyframes to create the character's performance**

Walk Cycle Variations



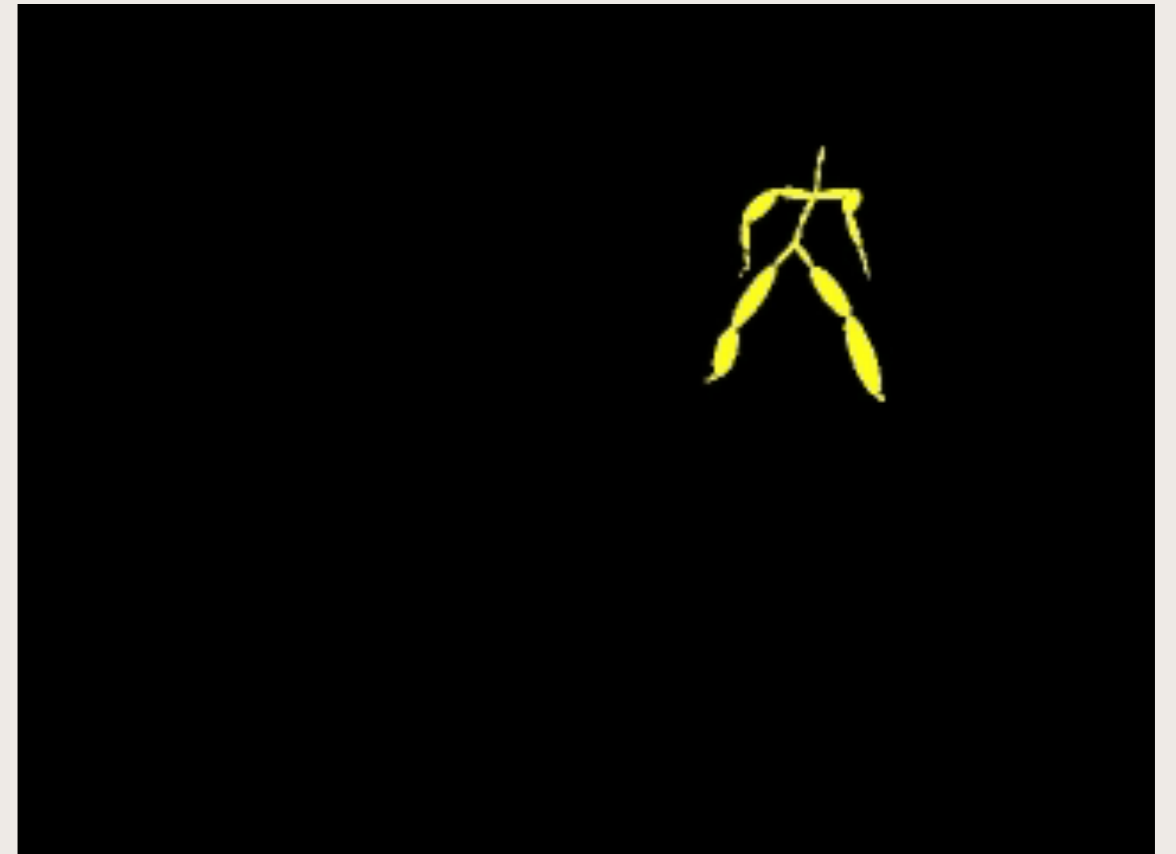
<http://www.amazon.com/Animators-Survival-Kit-Richard-Williams/dp/0571202284>

Keyframing: process

Changing keyframed data can be straightforward, especially early on

- Edit IK controls and joint angles in existing keyframes**
- Add new keyframes to enhance / add detail to the motion**

Working with Motion Capture is Quite Different...



<http://mocap.cs.cmu.edu/>
<https://www.mixamo.com/>

CMU Mocap Database

To define a motion, we need:

A definition of the skeleton

A description of the motion

Let's look at these...

Editing Motion Capture Data

How can you edit motions in this format?

Retiming

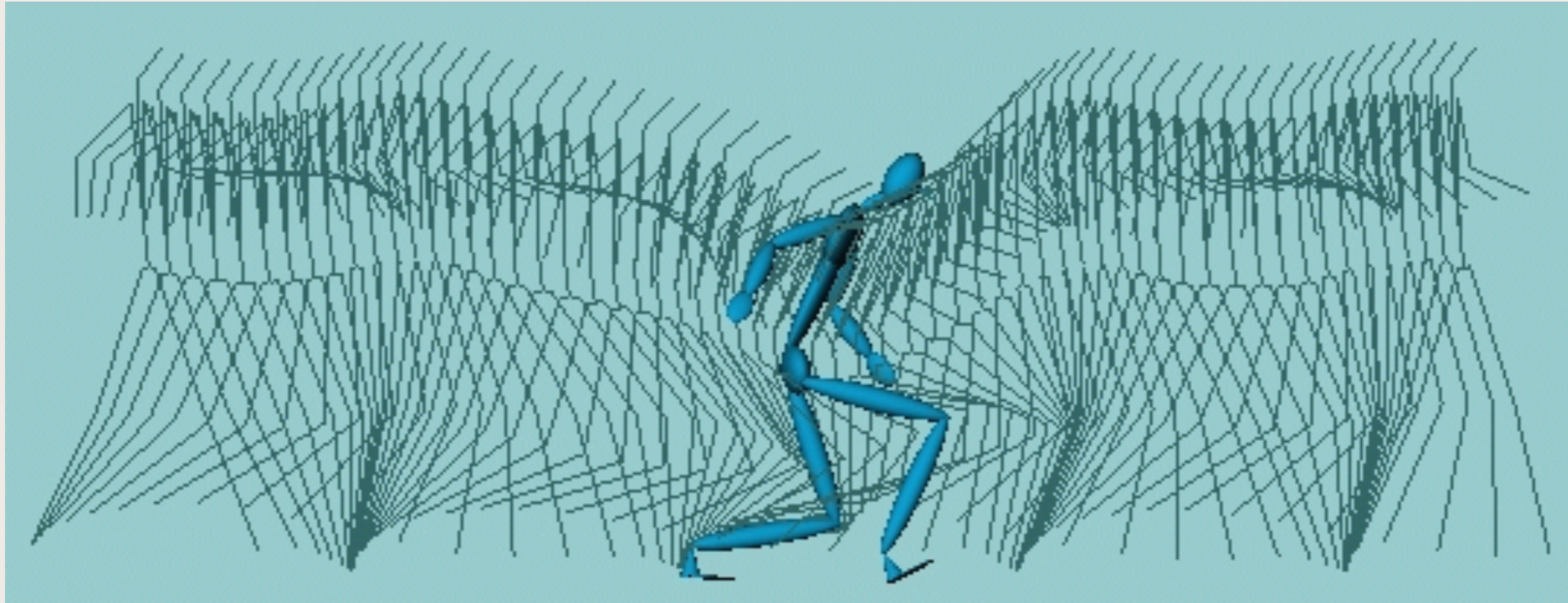
Displacement curves

Motion “filtering”

Keyframe extraction / edit keyframes

***Train a network to generate varied motions based on context**

Displacement Curves

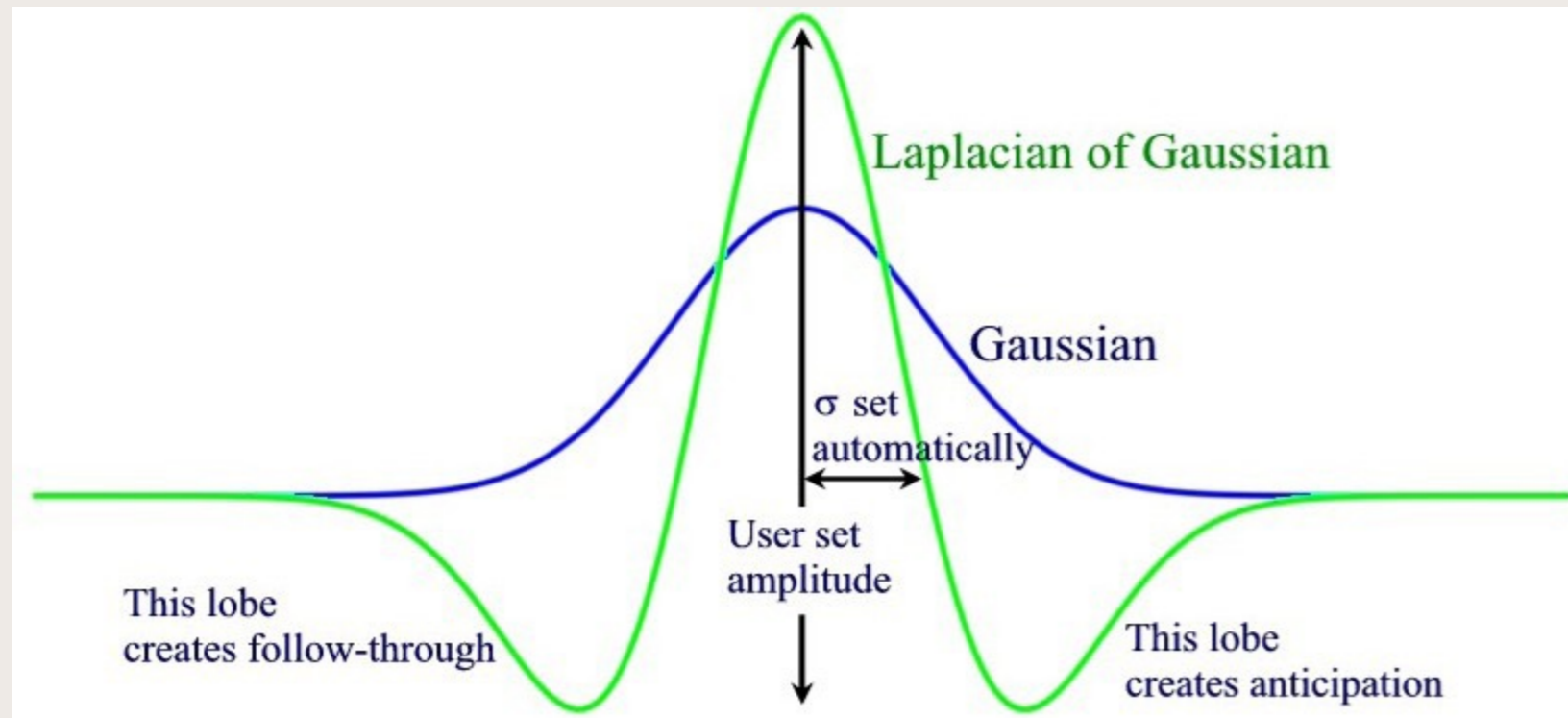


Main ideas:

- **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



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

Motion Modeling



Main idea:

- **Plausible motion can be determined by the character's overall goal (walk, sit...) and local geometric context**

Sebastian Starke, He Zhang, Taku Komura, and Jun Saito
Neural State Machine for Character-Scene Interactions
SIGGRAPH 2019

<https://www.youtube.com/watch?v=7c6oQP1u2eQ>