# CS 6204 Character Animation

## *Research Review*

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### *Virginia Tech*

# Objective

*What are the research directions that are active in recently years?*

*What are the problems and research contributions in some of these research directions?*

# Research Areas in Character Animation

- *Full body animation*

- *Facial animation*

- *Crowd simulation*

- *Hand animation*

- *Hair animation*

- *Secondary animation*

# Research Questions

*How to generate realistic, natural - looking, or stylized character motion?*

- Realistic

- Natural-looking

- Stylized

# Research Questions

*How to generate realistic,*
*or stylized character m[...]*

- **Realistic**

- Natural-looking

- Stylized

# Research Questions

*How to generate realistic, natural - looking*
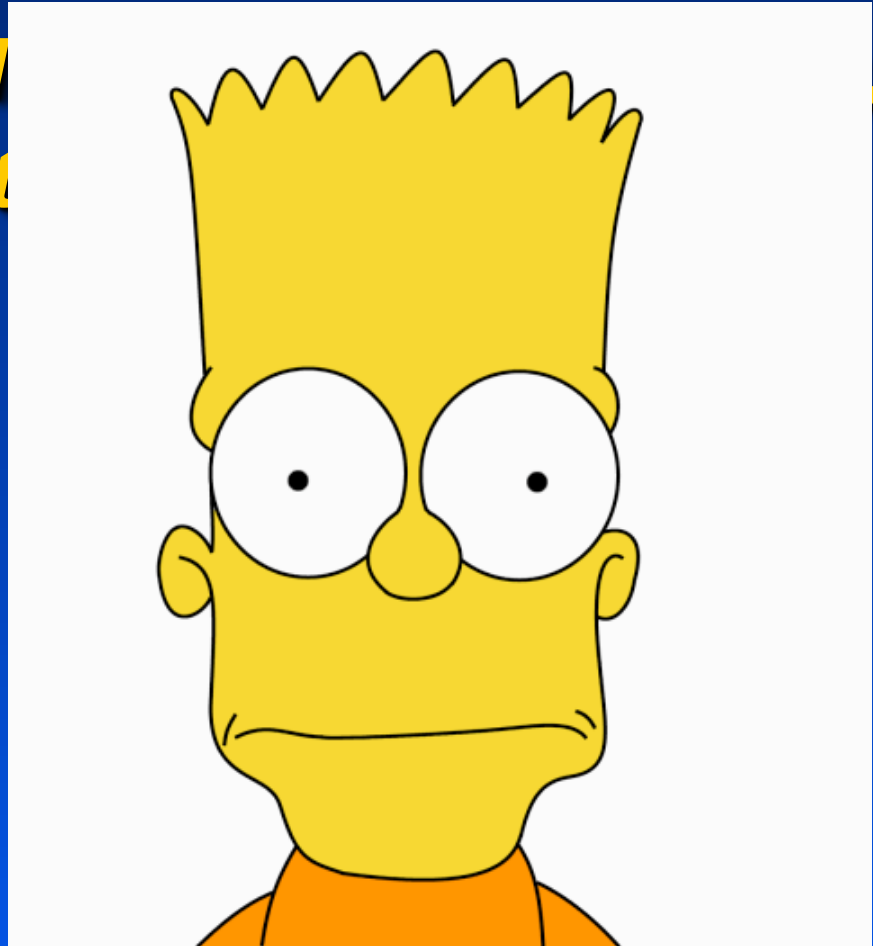*or stylized ch*

- Realistic
- **Natural-looking**
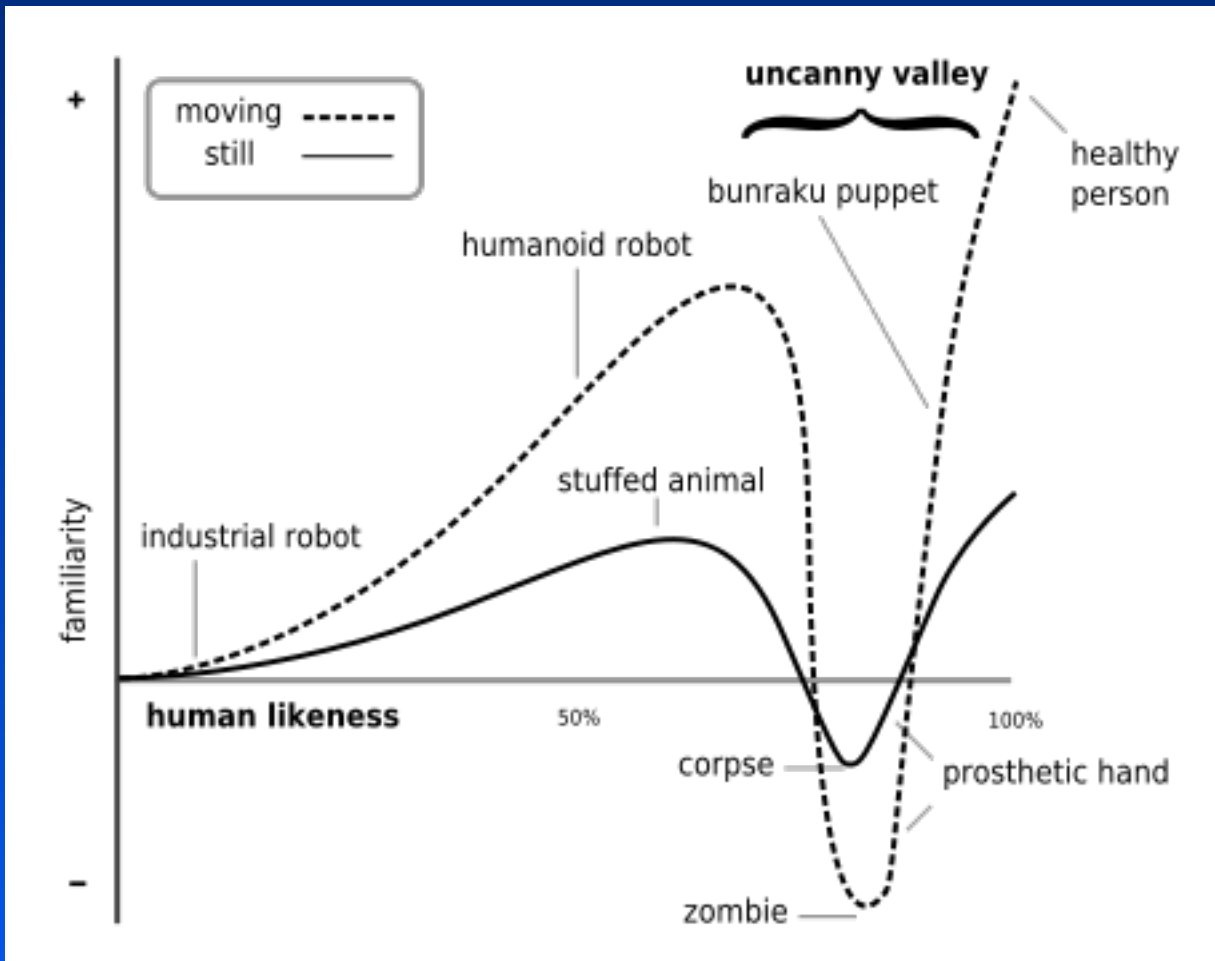- Stylized

# Research Questions

*How to generate real_____, or stylized charact_____*

- Realistic
- Natural-looking
- **Stylized**



Courtesy of FOX Broadcasting Company

# Uncanny Valley

# Full body animation
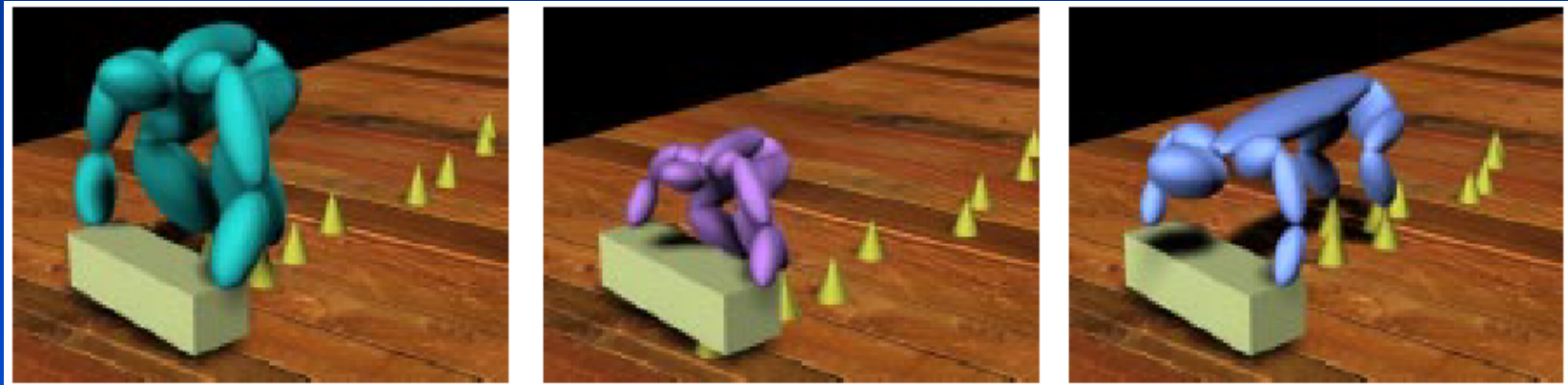
## *Motion Capture Based*

- + Realistic

- - Hard to edit

    - *Retargeting*

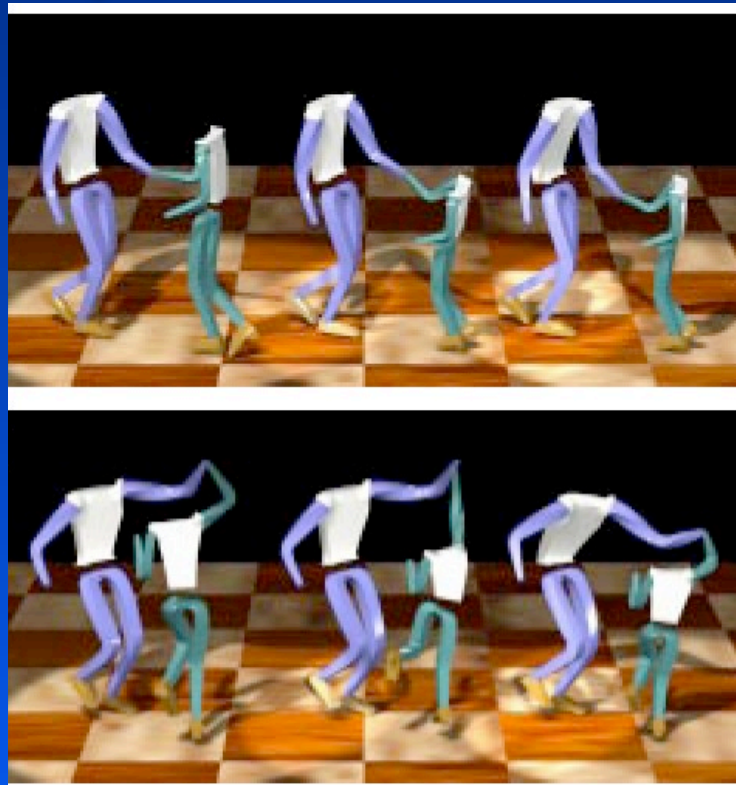    - *Motion Transition*

    - *Motion re-sequencing*

# Motion Retarget

- *Michael Gleicher, "Retargeting Motion to New Characters", SIGGRAPH 1998*
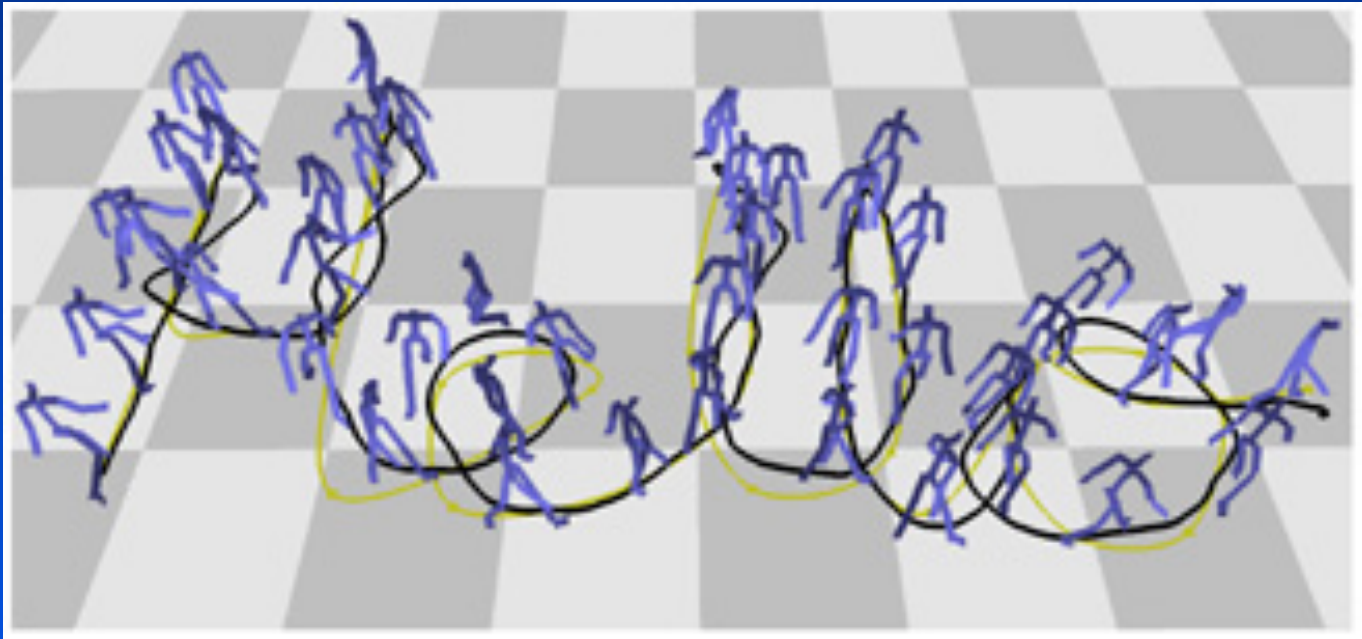
# Motion Retarget

- *Michael Gleicher, "Retargeting Motion to New Characters", SIGGRAPH 1998*
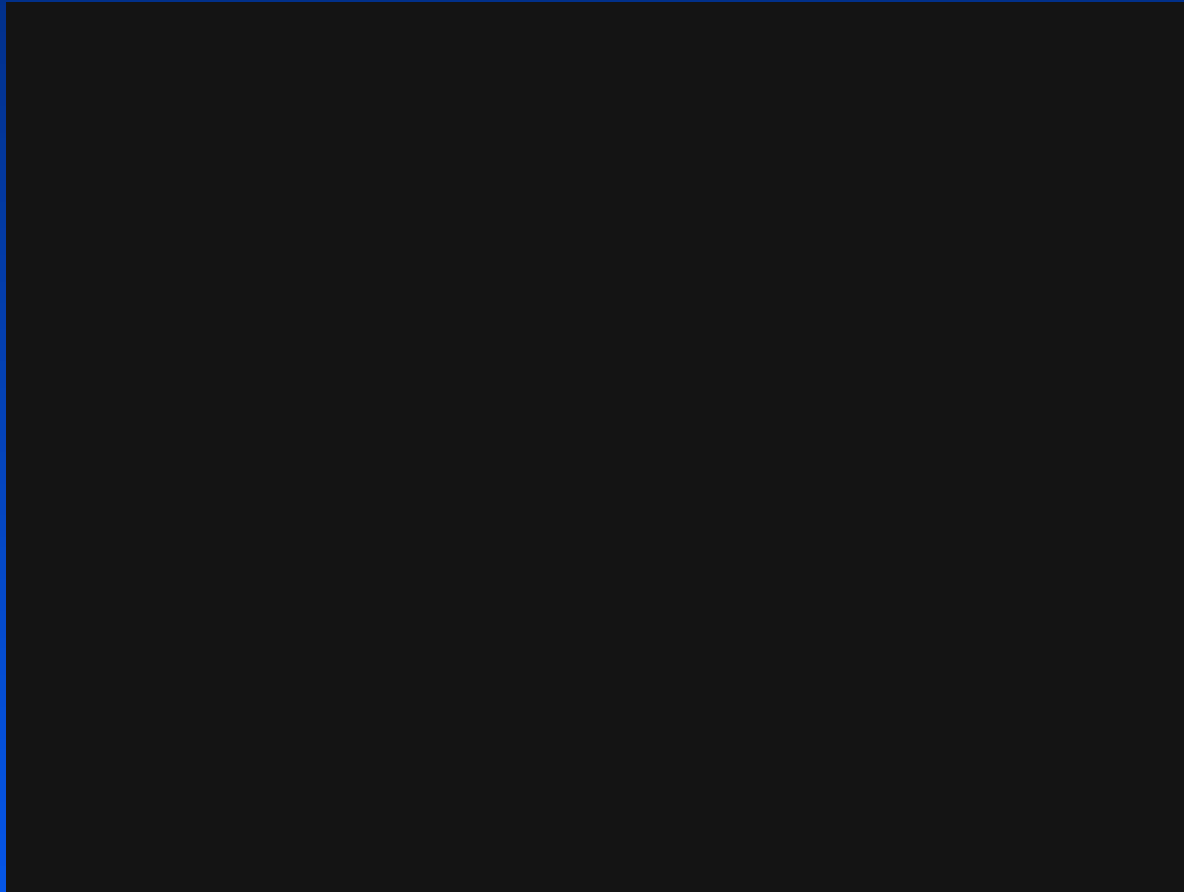
# Motion Graph

*Lucas Kovar, Michael Gleicher and Fred Pighin, "Motion Graphs"*
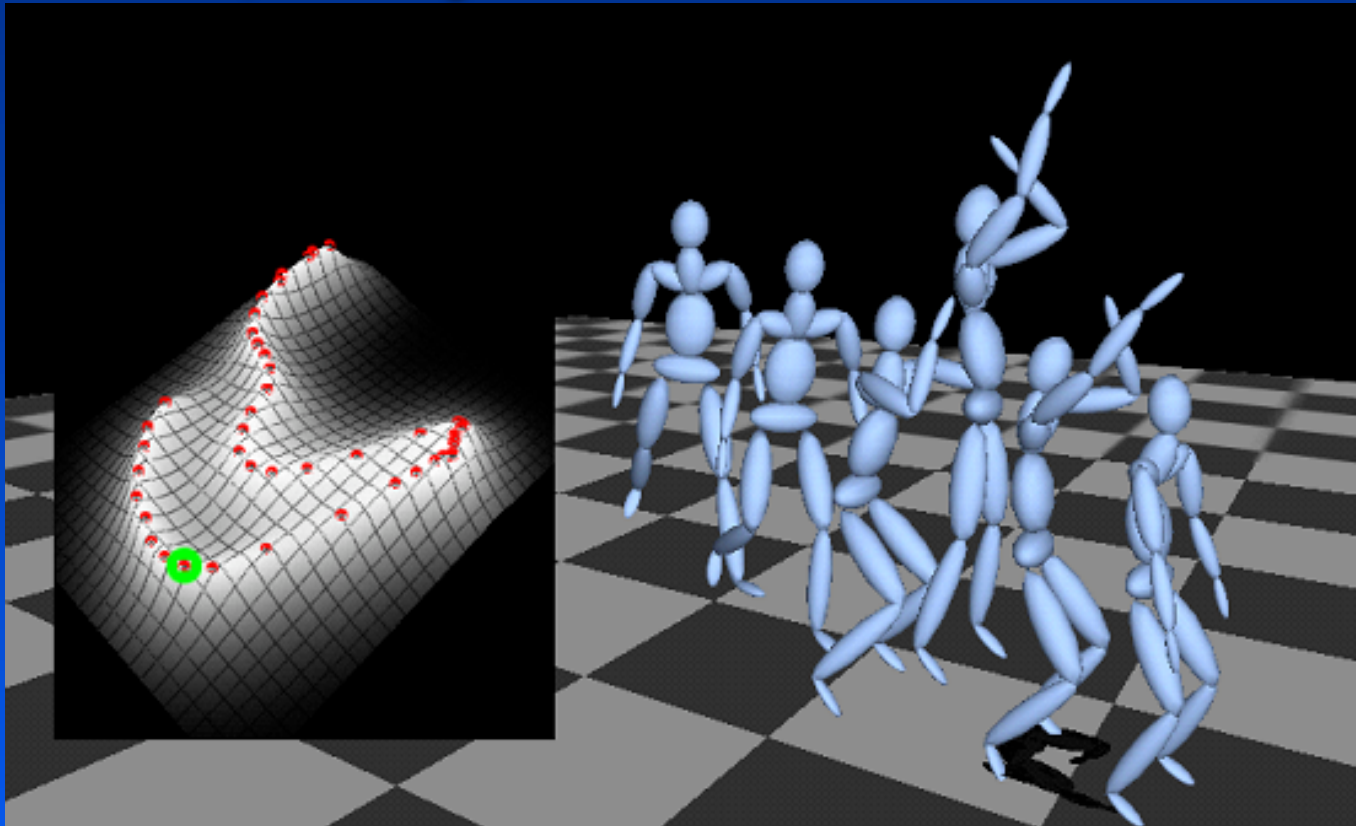
# Motion Graph

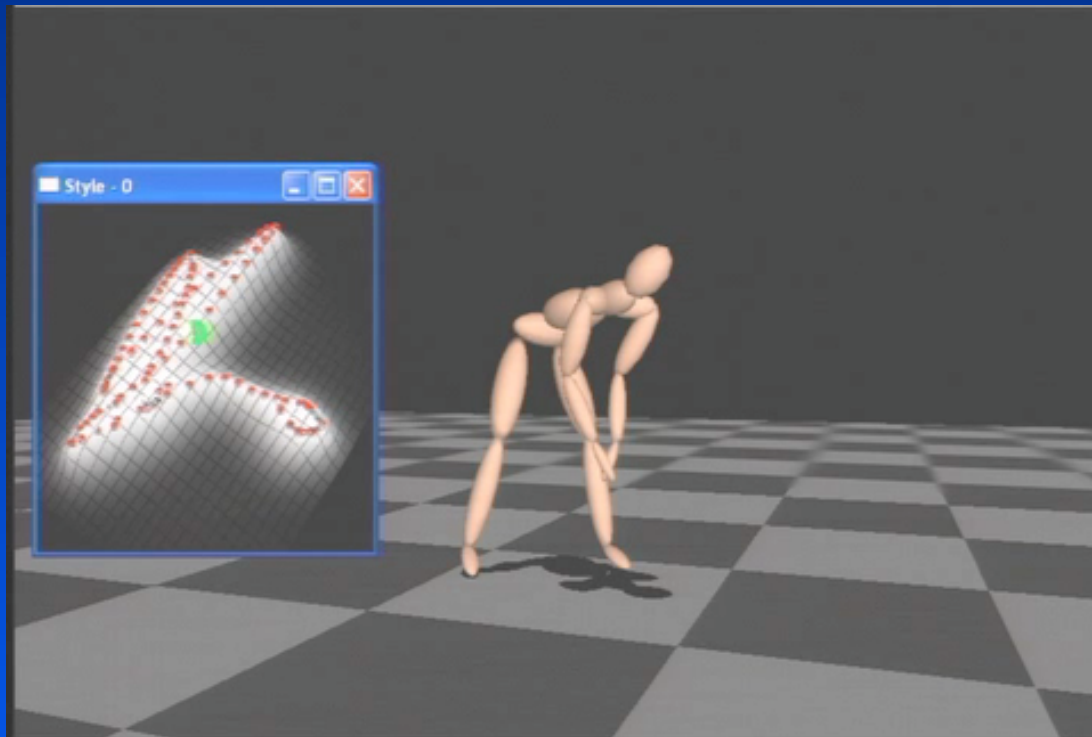*Lucas Kovar, Michael Gleicher and Fred Pighin, "Motion Graphs"*

# Motion Editing

*GROCHOW, K., MARTIN, S. L., HERTZMANN, A., AND POPOVIC , Z. "Style-based inverse kinematics"*

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*GROCHOW, K., MARTIN, S. L., HERTZMANN, A., AND POPOVIC , Z. "Style-based inverse kinematics"*
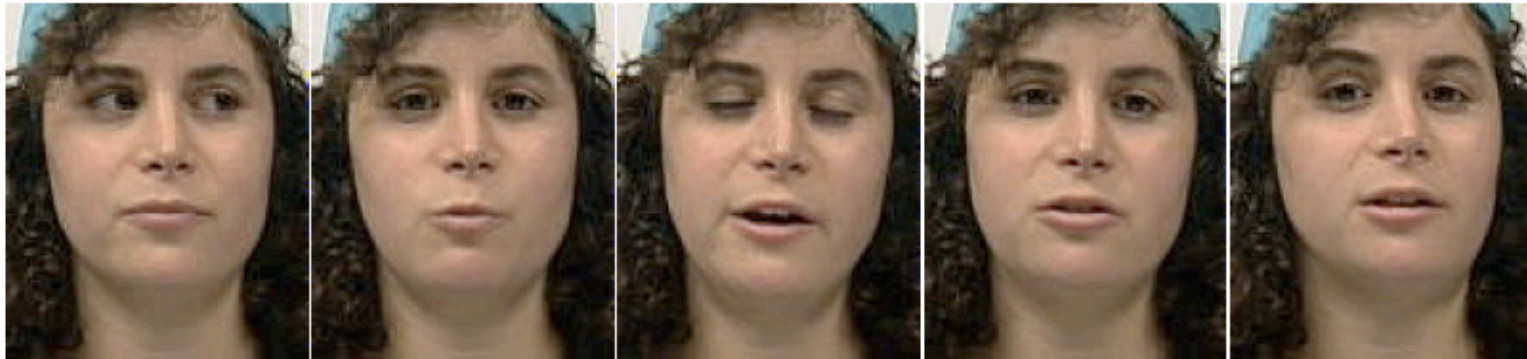
# Facial Animation

*Lip-syncing*

*Expressions*

# Lip-syncing

*BREGLER, C., COVELL, M., AND SLANEY, M. "Video rewrite: driving visual speech with audio"*

# Lip-syncing

**Yong Cao, Petros Faloutsos, Eddie Kohler, Fred Pighin,**
**"Real-time Speech Motion Synthesis from Recorded Motions"**

# Lip-syncing

*Yong Cao, Petros Faloutsos, Eddie Kohler, Fred Pighin,*
*"Real-time Speech Motion Synthesis from Recorded Motions"*

ACM SIGGRAPH / Eurographics
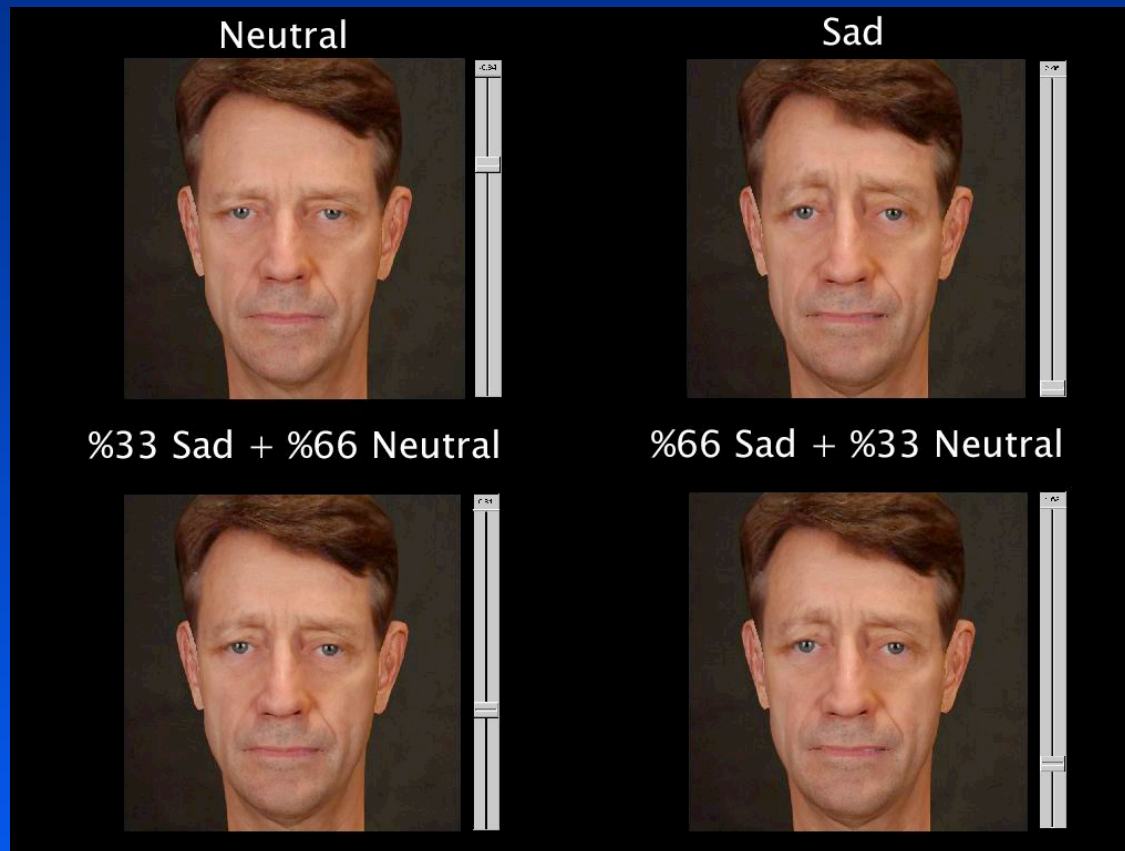Symposium on Computer Animation 2004

Real-time Speech Motion Synthesis
from Recorded Motions

Submission ID #102

# Expression

*Yong Cao, Petros Faloutsos, Fred Pighin "Unsupervised Learning for Speech Motion Editing"*

# Expression

*Yong Cao, Petros Faloutsos, Fred Pighin "Unsupervised Learning for Speech Motion Editing"*



Eurographics/SIGGRAPH Symposium on Computer Animation 2003

Unsupervised Learning for Speech Motion Editing

Yong Cao[1,2]   Petros Faloutsos[1]   Frederic Pighin[2]

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[2]University of Southern California, Institute for Creative Technology

# Crowd Simulation

*Agent Based Simulation*

*Crowd Control*

*Path Planning*

*…*

# Agent Based

*W. Shao, D. Terzopoulos, "Autonomous Pedestrians"*

Animation of Autonomous Pedestrians
in Urban Environments

(this video has sound)

# Path Planning

*Adrien Treuille, Seth Cooper, Zoran Popovi, "Continuum Crowds"*