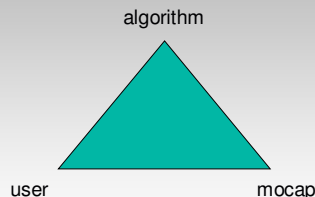


## An Introduction to Computer Animation

*Michiel van de Panne*

## Animation Sources



## Motion Notation

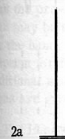
- 1700 "Choregraphie", Feuillet
- 1852 "Stenochoregraphie", Arthur Saint Leon
- 1928 "Notation of Movement", Margaret Morris
- 1928 "Schrifttanz", Rudolf von Laban
- 1940 "Kinetography Laban" (Labanotation)
- 1950's Eshkol & Wachmann: mathematical notation
- 1956 "Choreology", Joan and Rudolf Benesh

## Motion Notation

### Labanotation

"Labanotation",  
Ann Hutchinson

double starting line.



2a  
Actions on the  
right side only



b  
An action on  
the right then  
on the left side

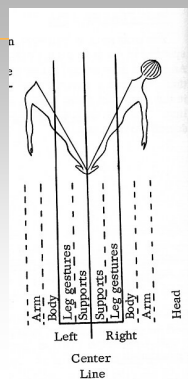


c  
A left-sided action fol-  
lowed by simultaneous  
actions on both sides

This vertical center line forms the basis of the vertical three-line staff on which structured description is written.

## Motion Notation

### Labanotation



"Labanotation",  
Ann Hutchinson

## Motion Notation

### Labanotation

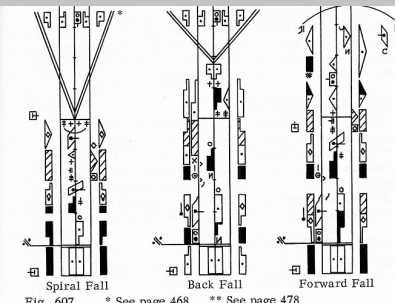


Fig. 607 \* See page 468 \*\* See page 478

"Labanotation",  
Ann Hutchinson

# Animation History

University of British Columbia

## Film Animation

- 1914 Windsor McCay – Gertie the Dinosaur
- 1923 Walt Disney, “Alice in Wonderland”
- 1928 Walt Disney, “Mickey Mouse”
- 1969 Burtnyk & Wein, NRCC, computer keyframing
- 1988 Pixar “Tin Toy”
- 1995 Pixar “Toy Story”, full-length CG film
- 2001 Square “Final Fantasy”, CG people

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# Traditional Animation

University of British Columbia

## The Multiplane Camera

(from “The Illusion of Life” Frank Thomas and Ollie Johnson)

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# Traditional Animation

University of British Columbia

animation Windsor McCay—Gertie the Dinosaur. Cartoonist Windsor McCay was the first to recognize animation as an art form. His best remembered film is Gertie the Dinosaur, done in 1914. Historian John Canemaker points out that Gertie was the first animated personality, showing shyness and timidity and eventually weeping big tears when she was criticized. The audience loved it, but ten years later both the film and the techniques had been forgotten.

(from “The Illusion of Life” Frank Thomas and Ollie Johnson)

© Michiel van de Panne

# Traditional Animation

University of British Columbia

(from “The Illusion of Life” Frank Thomas and Ollie Johnson)

© Michiel van de Panne

# Traditional Animation

University of British Columbia

Expert model-makers constructed a jointed armature of a young deer for the animators to study while working on Bambi. Based on Rico Lebraun’s drawings, everything moved correctly, right down to the toes.

(from “The Illusion of Life” Frank Thomas and Ollie Johnson)

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# 3D Animation (keyframing)

University of British Columbia

p. 151, “[digital] character animation 2”, G. Maestri

p. 44, “[digital] character animation 2”, G. Maestri

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## 3D Animation (keyframing)

University of British Columbia

**Issues**

- complete control over motion
- rigging character
- time consuming
- not real-time

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## Animation Sources

University of British Columbia

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## Motion Capture

University of British Columbia

**Muybridge, 1884**  
**Rotoscoping**

(Figure from "Animals in Motion", Muybridge)

© Michiel van de Panne

## Motion Capture

University of British Columbia

**Muybridge**

(Figure from "Animals in Motion", Muybridge)

© Michiel van de Panne

## Motion Capture

University of British Columbia

(Figure from Ascension Inc.)

© Michiel van de Panne

## Motion Capture

University of British Columbia

(Figure from Northern Digital Inc.)

© Michiel van de Panne

## Motion Capture

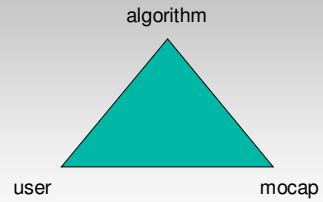


### Issues

- modifying mocap data
- building graphs
- annotation of data
- data cleanup
- data compression

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## Animation Sources



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## Physics-based Simulation

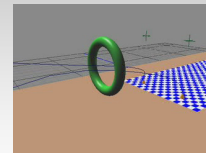
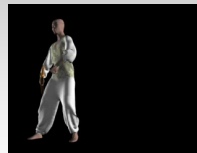


### Issues

- realistic
- simulation parameters?
- difficult to control

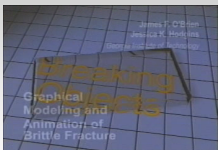
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## Simulation of Passive Motion



© Michiel van de Panne

## Simulation of Passive Motion



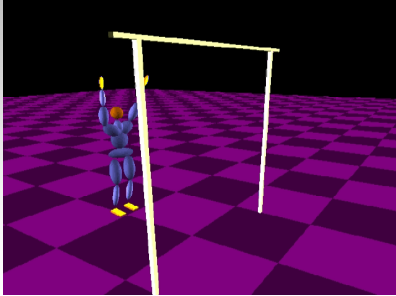
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## Simulation of Active Motion



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## Simulation of Active Motion



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