HIGH-LEVEL SCRIPTING
AVATAR ANIMATION
3-D ARTICULATED AVATAR

Face Model
(Facial Action Coding)

Body Model
(Joint Control)

Face muscle-activation instructions

Joint-activation instructions

Voice synthesizer

Avatar /"Machine" – level Instructions

• INTERPRETER/COMPILER
• INVERSE KINEMATIC CONTROL

Story-level Instructions

ANIMATION SCRIPT
STORY-LEVEL INSTRUCTIONS

DaneelA sits on the chair#4.
*DanielA writes “Hello” on stationary.*
He sees HappyCat under the white table.
DaneelA starts smiling.
HappyCat grins back.

SKILL-LEVEL (“MACRO”) INSTRUCTIONS

*DanielA’s right hand moves the pen to follow the trace representing “H”.*
*DanielA’s right hand moves the pen to follow the trace representing “e”.*
*DanielA’s right hand moves the pen to follow the trace representing “l”.*
*DanielA’s right hand moves the pen to follow the trace representing “l”.*
*DanielA’s right hand moves the pen to follow the trace representing “o”.*
SKILL-LEVEL (“MACRO”) INSTRUCTIONS

DanielA’s right hand moves the pen to follow the trace representing “H”.

DanielA’s specific style of moving his right arm joints to write “H” (NN model capturing DanielA’s writing personality)

\[
\begin{align*}
\text{Rotate Wrist to } & \alpha_i \\
\text{Rotate Elbow to } & \beta_j \\
\text{Rotate Shoulder to } & \gamma_k
\end{align*}
\]
Behavior-Based Script Language for Anthropomorphic Avatar Animation in Virtual Environments

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Scripting language for avatar animation

• Highest level of abstraction: story-level description
  – constrained English-like description
  – syntactic and semantic analysis to extract information such as:
    main player(s), action, subject and object of the action, relative
    location, degree, etc.
  – translate in a set of skill-level instructions, that may be executed
    sequentially or concurrently

• Middle level: basic skills
  – describe basic body and facial skills (such as walk, smile, wave
    hand, etc.)
  – each skill involves a number of muscle/joint activation instructions
    that may be executed sequentially or concurrently

• Lowest level: muscle/joint activation instructions
  – activation of individual muscles or joints to control the face, body
    or hand movement
Nancy’s animation

- Low-level: 47 joints and 15 segments (muscles)
- Middle-level: 12 movement skills implemented
  - group1: stand, walk, run, jump, turn left, turn right
  - group2: wave left hand, wave right hand
  - group3: kick left leg, kick right leg
  - group4: turn head left, turn head right

skills from different groups can be done concurrently
walk (5 steps)
create WA thread

wave left hand (3 times)
stop left arm when walking
create WLH thread

control walking (all joints)
sleep (walkTime * walkCycle)

control walking (without moving LH)
sleep (walkTime * walkCycle)
control waving

control walking (all joints)
sleep (walkTime * walkCycle)

done walking

move left arm when walking
control walking (all joints)
done walking

walk (all joints)

walk (without moving LH)
wave LH

control waving
wave LH

sleep (waveTime)

control waving
wave LH

sleep (waveTime)

control waving
wave LH

sleep (waveTime)

control waving
wave LH

sleep (waveTime)

control waving
wave LH

sleep (waveTime)