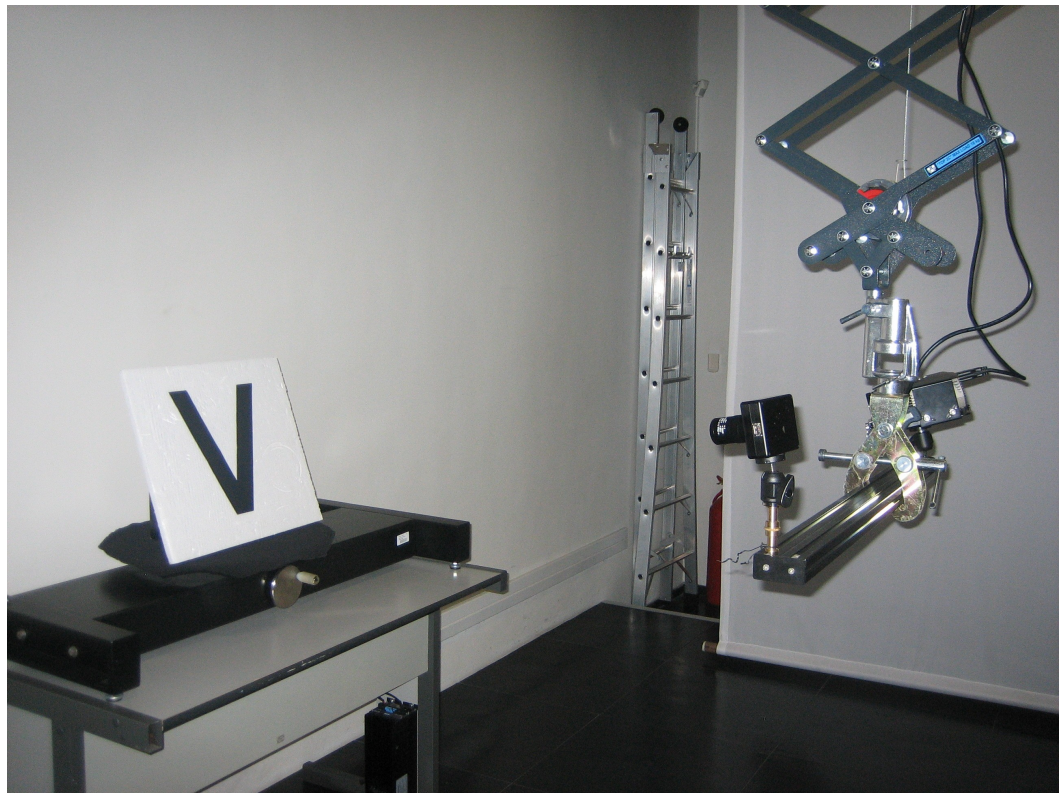
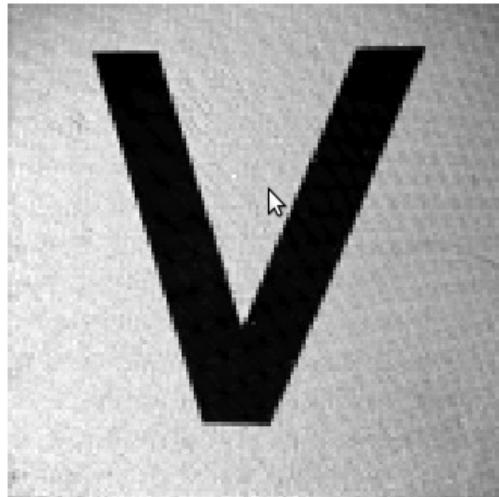


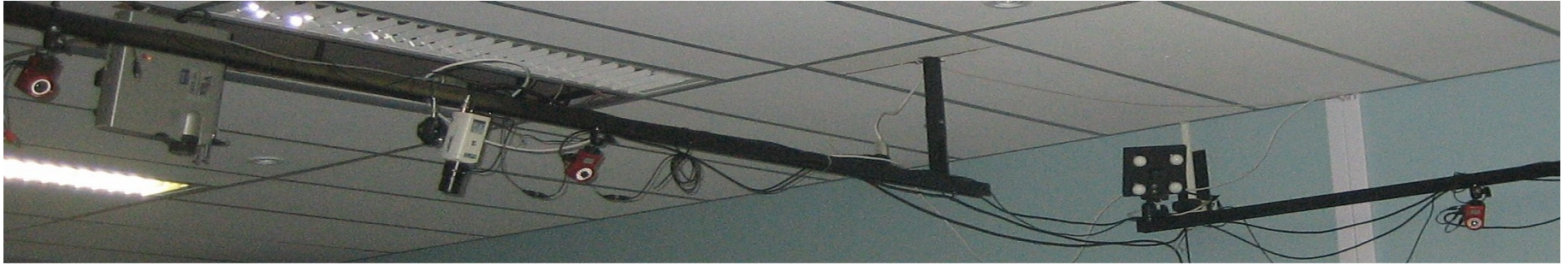
# **Experiencing 3D Graphics...**

**...again :)**

# My research ...



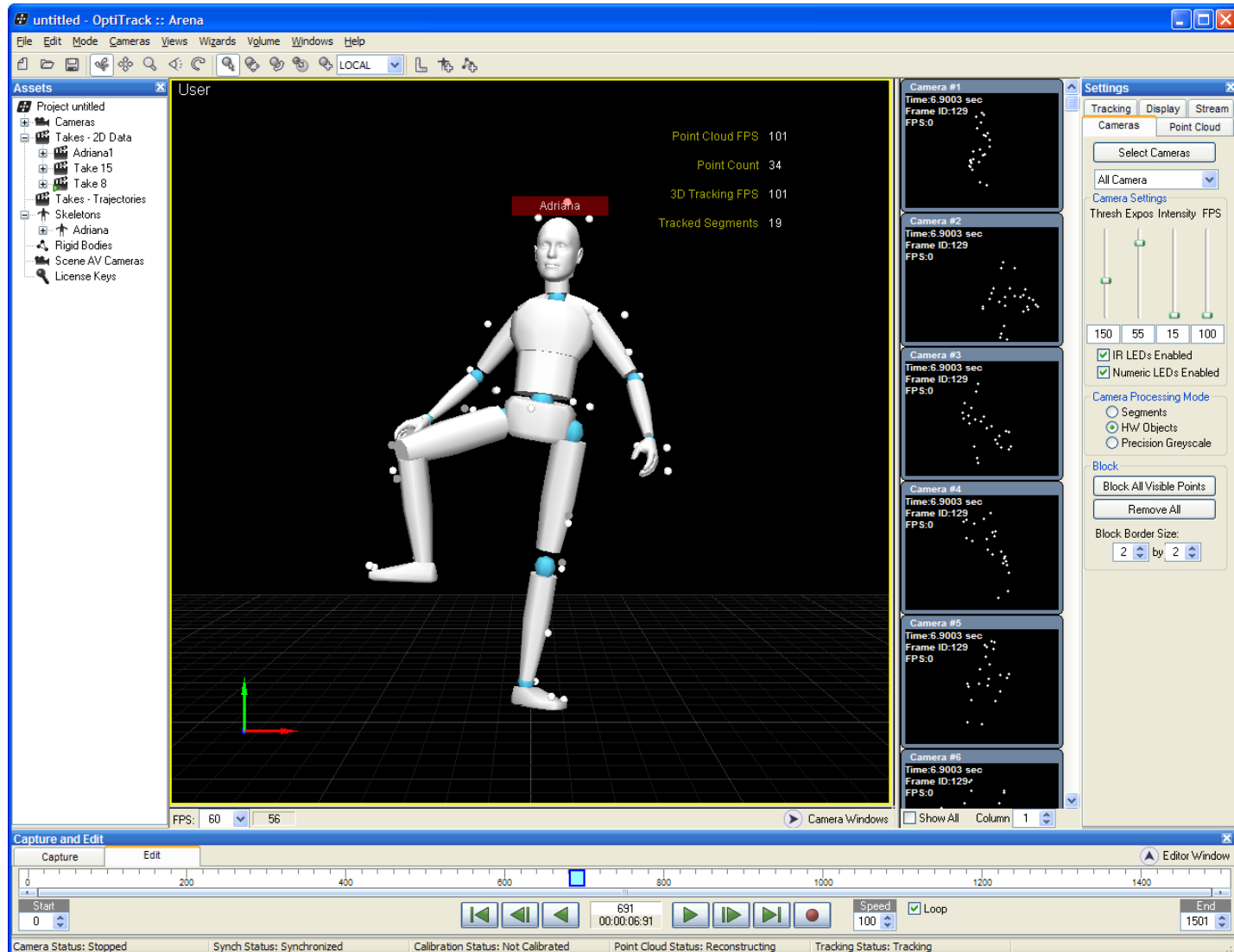
# My research ...



**Why 3D Graphics again?**

# Modeling

# MoCap Data



# MoCap Data

HIERARCHY

ROOT A

{

    OFFSET 0.000000 0.000000 0.000000

    CHANNELS 6 Xposition Yposition Zposition Zrotation Xrotation Yrotation

    JOINT B

    {

        OFFSET 10.000000 0.000000 0.000000

        CHANNELS 3 Zrotation Xrotation Yrotation

        End Site

        {

            OFFSET 0.000000 -20.000000 0.000000

        }

    }

}

MOTION

Frames: 3

Frame Time: 0.040000

30.0	80.0	20.0	0.0	0.0	0.0	0.0	0.0	0.0
30.0	80.0	20.0	60.0	0.0	0.0	0.0	0.0	0.0
30.0	80.0	20.0	60.0	0.0	0.0	-30.0	0.0	0.0

# MoCap Data

HIERARCHY

ROOT A

{

  OFFSET 0.000000 0.000000 0.000000

  CHANNELS 6 Xposition Yposition Zposition Zrotation Xrotation Yrotation

  JOINT B

  {

    OFFSET 10.000000 0.000000 0.000000

    CHANNELS 3 Zrotation Xrotation Yrotation

    End Site

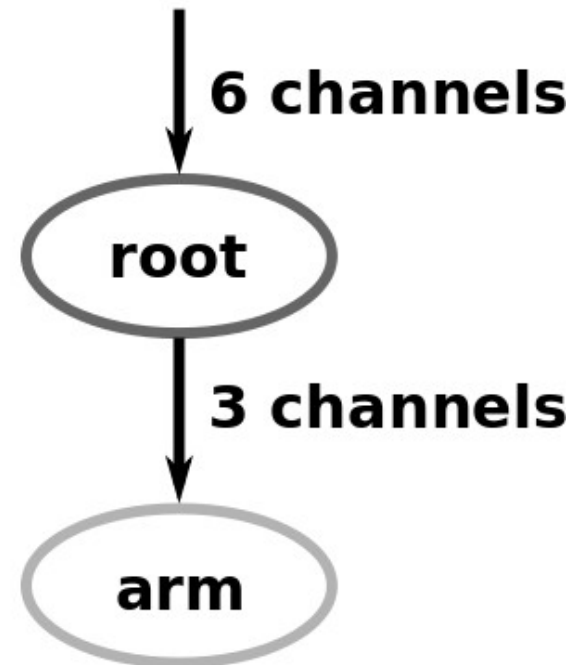
    {

      OFFSET 0.000000 -20.000000 0.000000

    }

  }

}





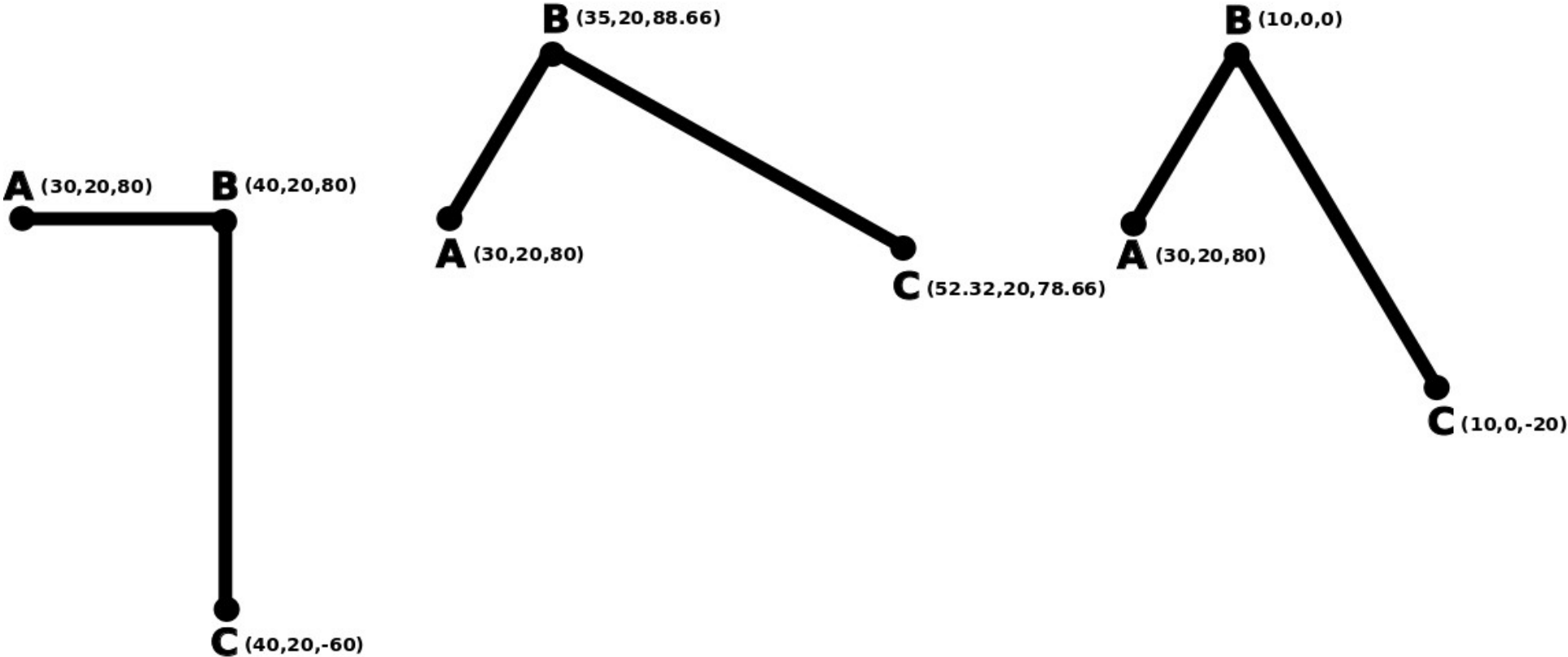
# MoCap Data

MOTION

Frames: 3

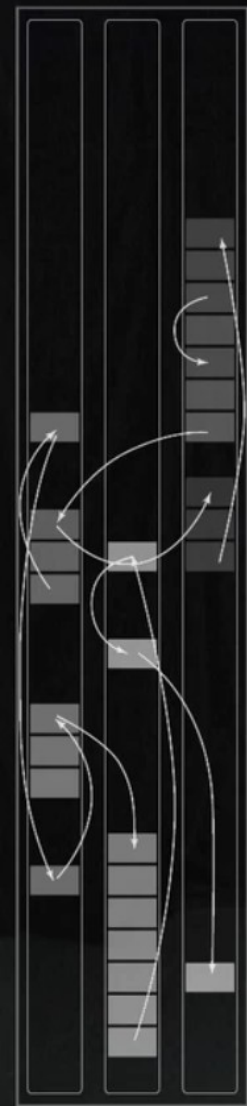
Frame Time: 0.040000

30.0	80.0	20.0	0.0	0.0	0.0	0.0	0.0	0.0
30.0	80.0	20.0	60.0	0.0	0.0	0.0	0.0	0.0
30.0	80.0	20.0	60.0	0.0	0.0	-30.0	0.0	0.0



# **Applications of Hierarchic Modeling**

# A Motion Graph



Dance Graph



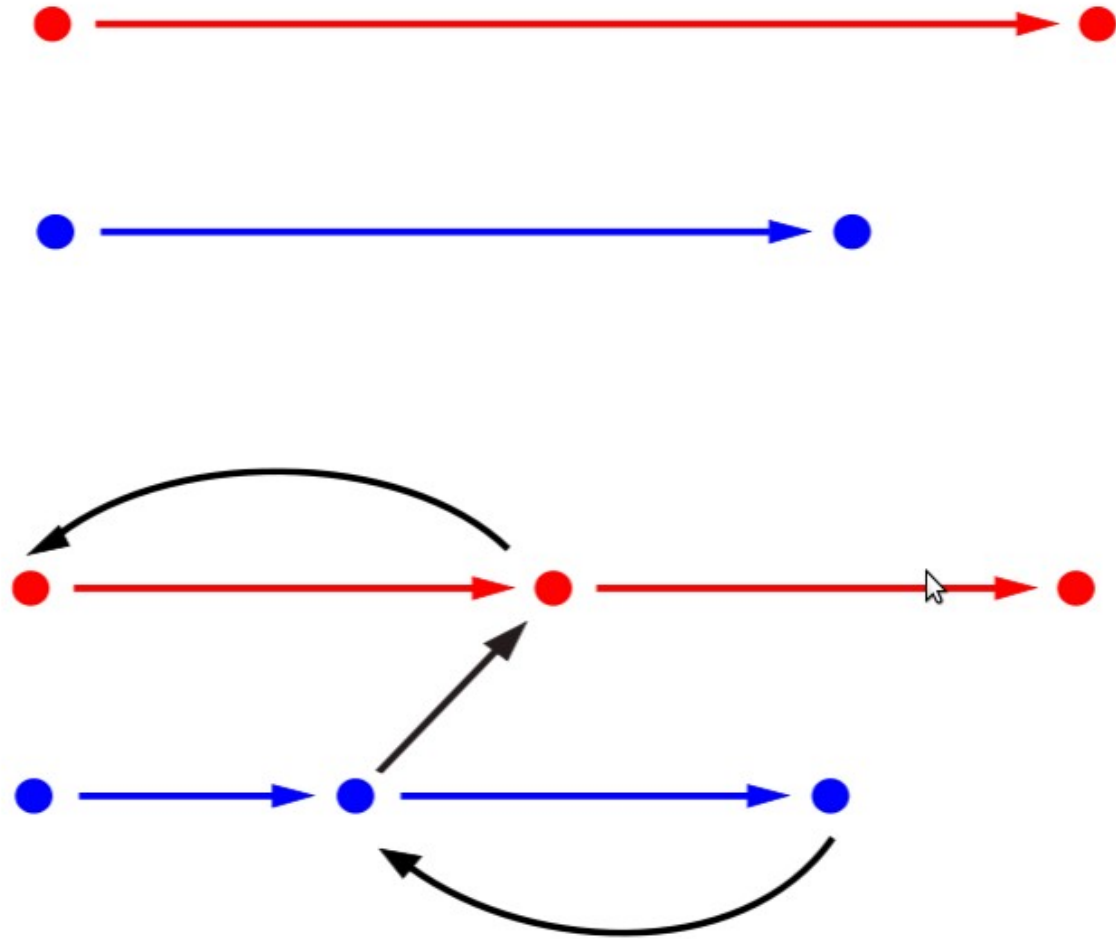
Clip: 3 Seg: 30 Frame: 2533

Cycle: 4 Bar: 14 Beat: 1

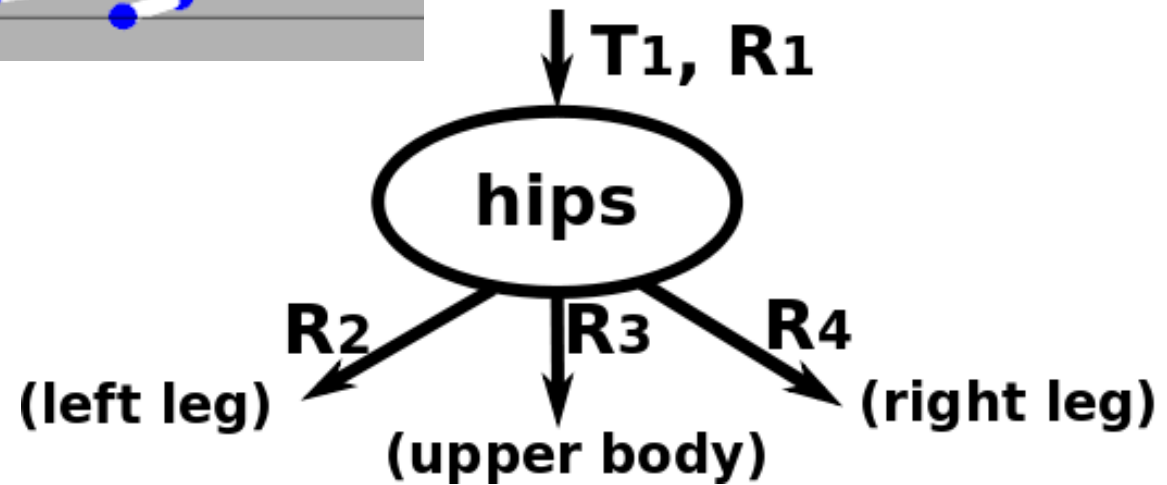
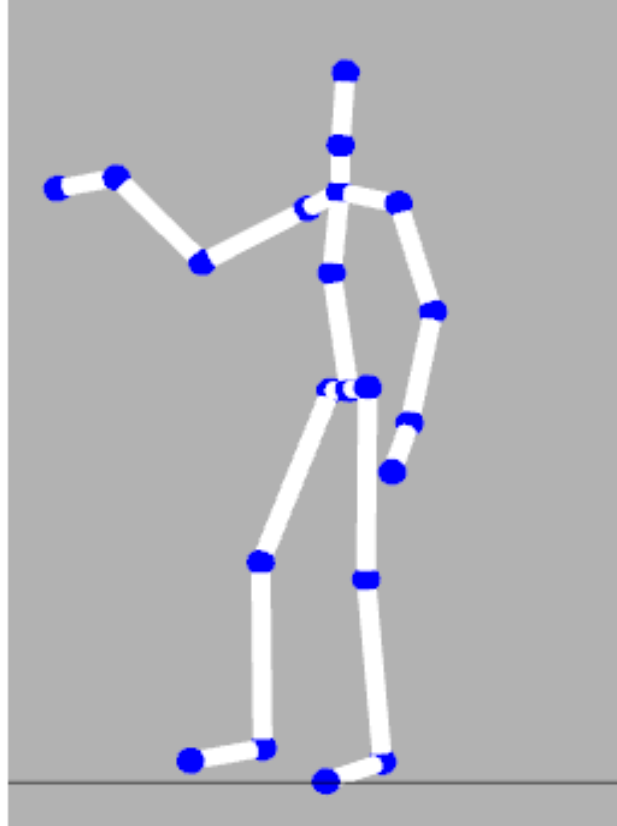
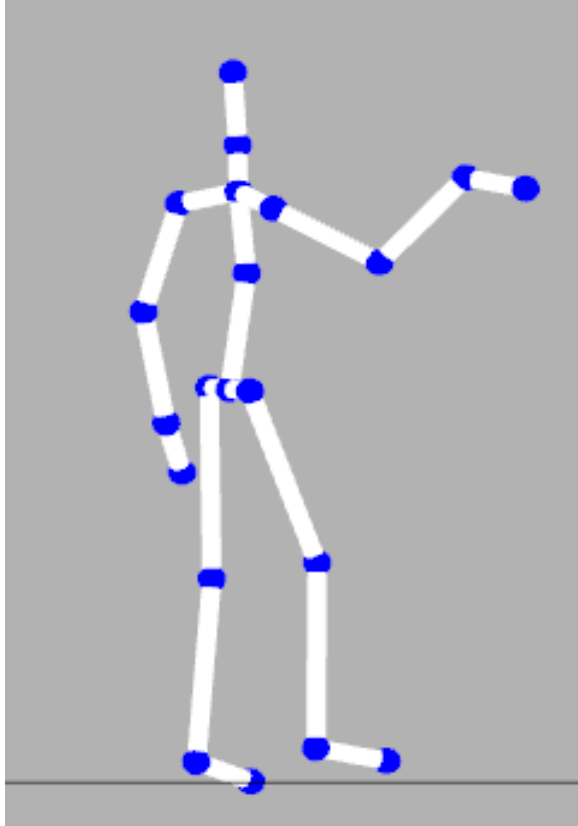


Clarinet

# A Motion Graph



# 2D Transforms



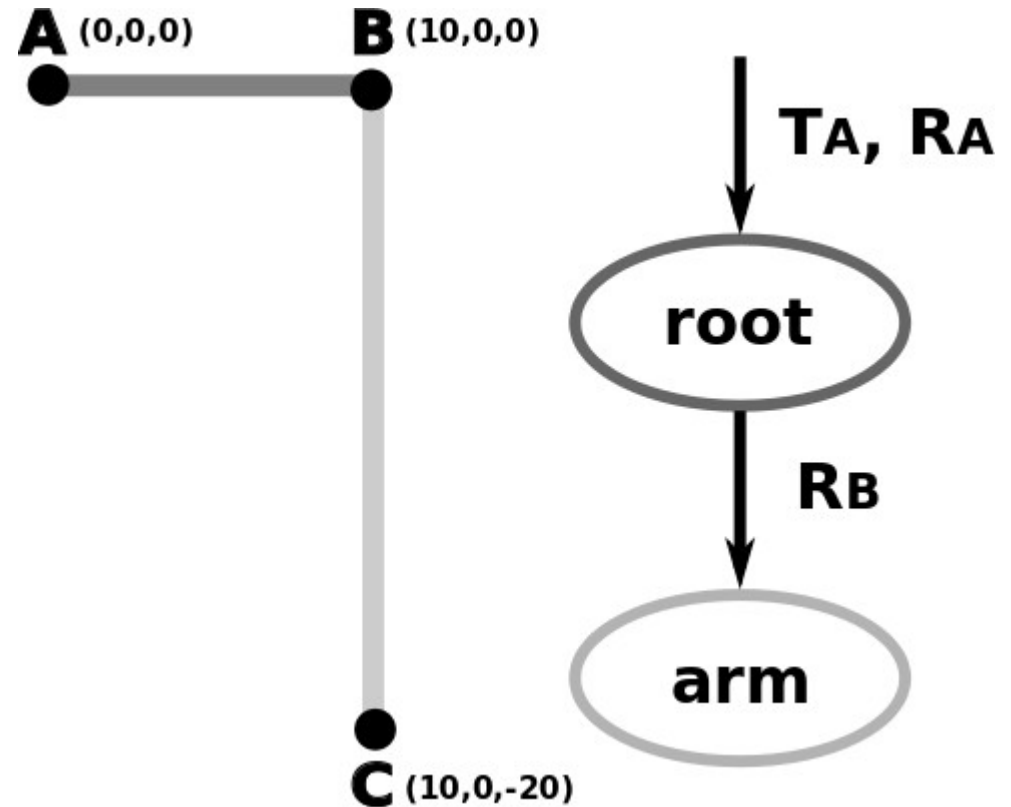
# 2D Transforms

$$\begin{cases} A = O_A + T_A \\ B = A + O_b R_A \\ C = B + O_c R_B R_A \end{cases}$$

$$\begin{cases} A' = (O_A + T_A) R_N + T_N \\ B' = (A + O_b R_A) R_N + T_N \\ C' = (B + O_c R_B R_A) R_N + T_N \end{cases}$$

$$\begin{cases} A' = (O_A + T_A) R_N + T_N \\ B' = A' + O_b R_A R_N \\ C' = B' + O_c R_B R_A R_N \end{cases}$$

$$\begin{cases} A' = T'_A \\ B' = A' + O_b R'_A \\ C' = B' + O_c R_B R'_A \end{cases}$$

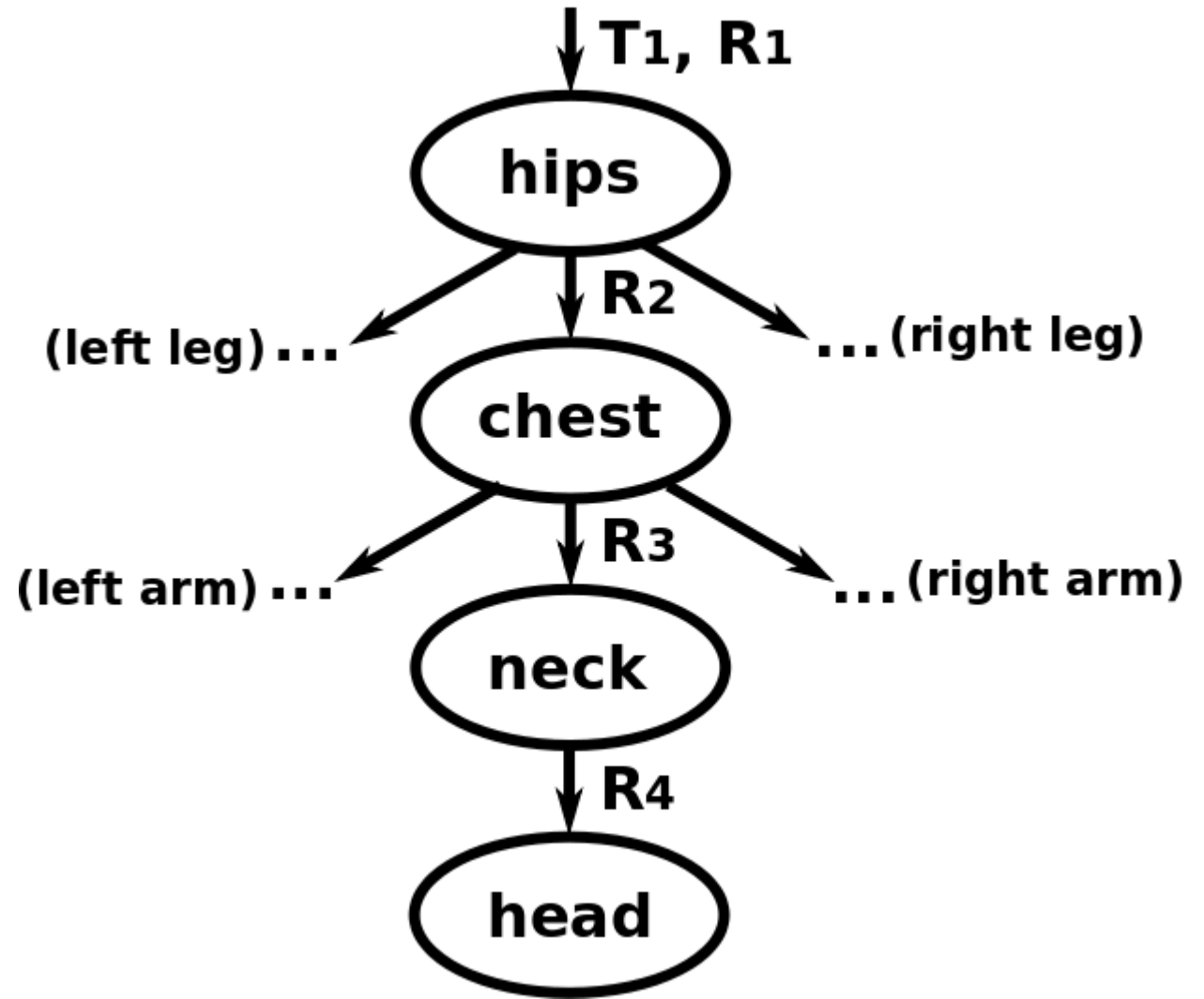
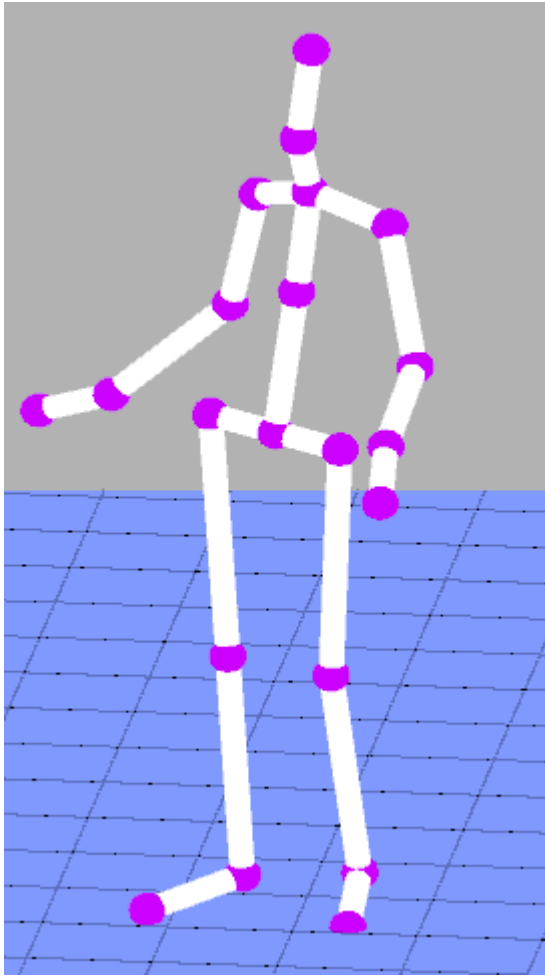


$$\begin{aligned} T'_A &= T_A R_N + T_N \\ R'_A &= R_A R_N \end{aligned}$$

# A Chorus Line

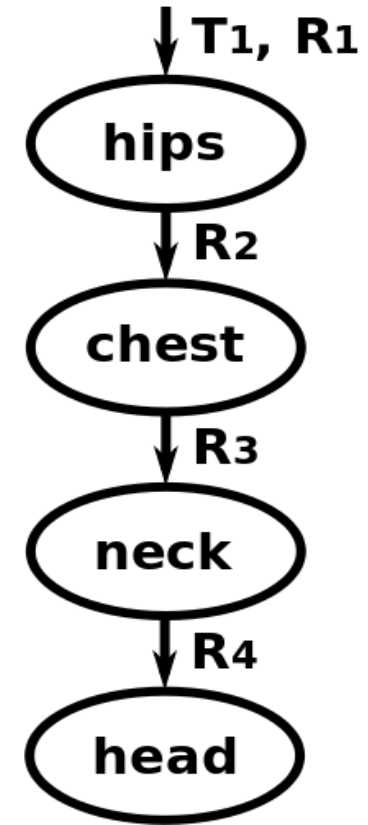
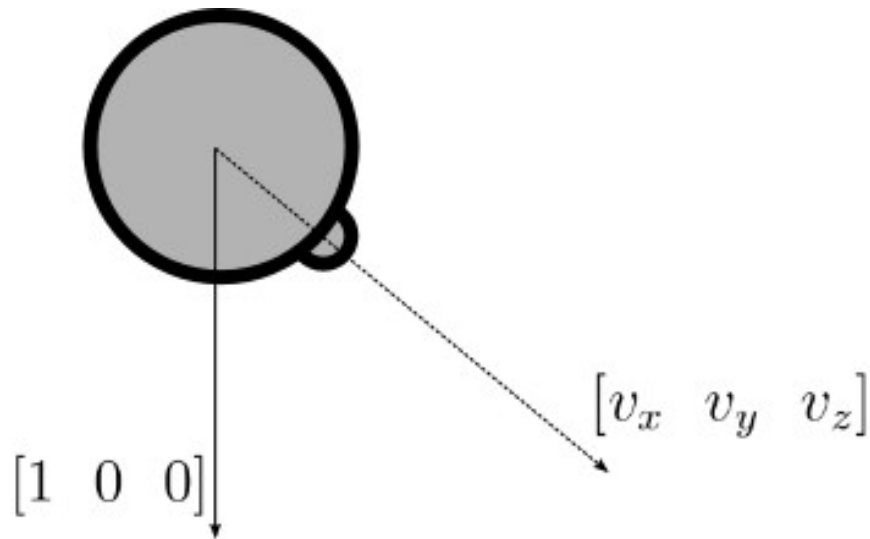


# Head Positioning





# Head Positioning



$$R_{\text{head}} = R_4 R_3 R_2 R_1$$

$$[v_x \ v_y \ v_z] = [1 \ 0 \ 0] R_{\text{head}}$$

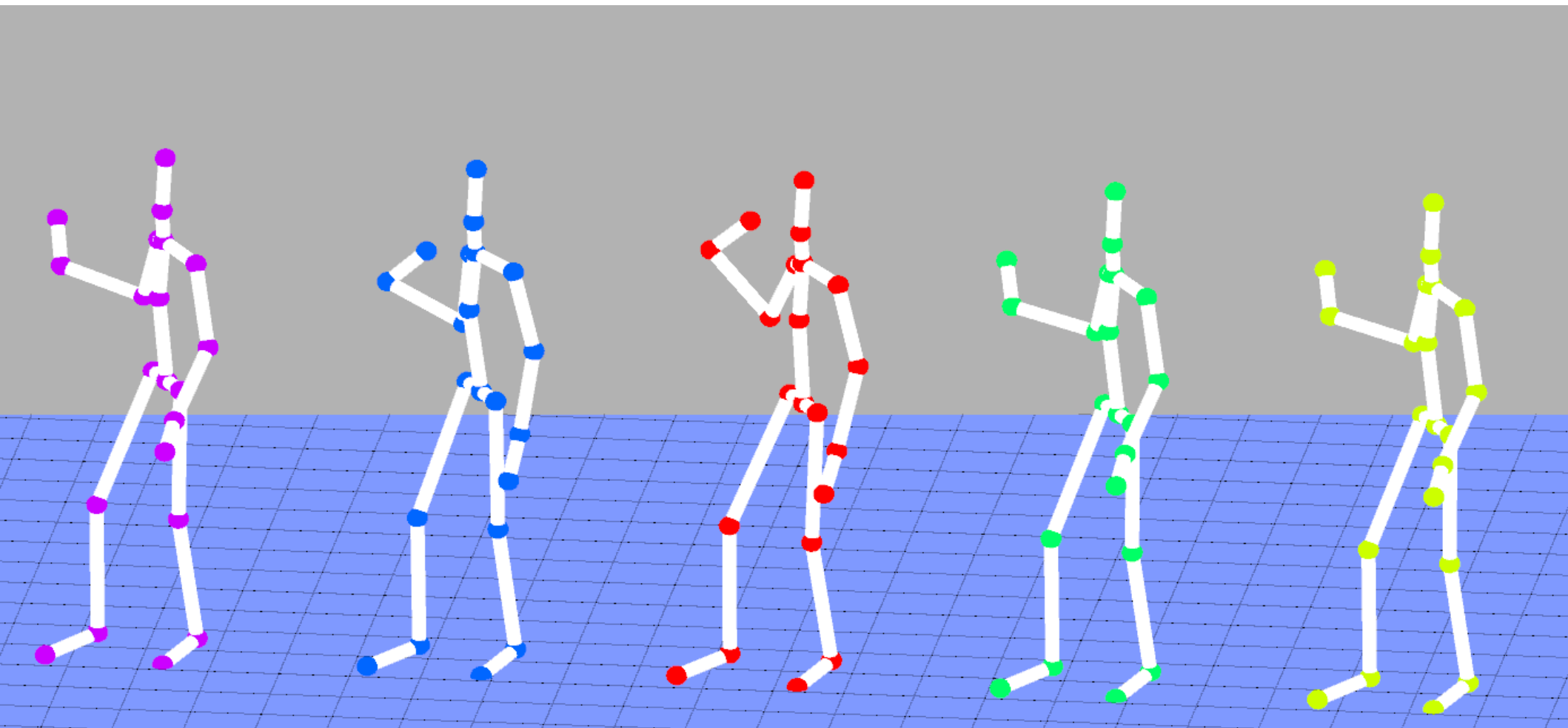
$$\theta = -\arctg \left( \frac{v_z}{v_x} \right)$$

$$R'_{\text{head}} = R_4 R_3 R_2 R_1 R_\theta$$

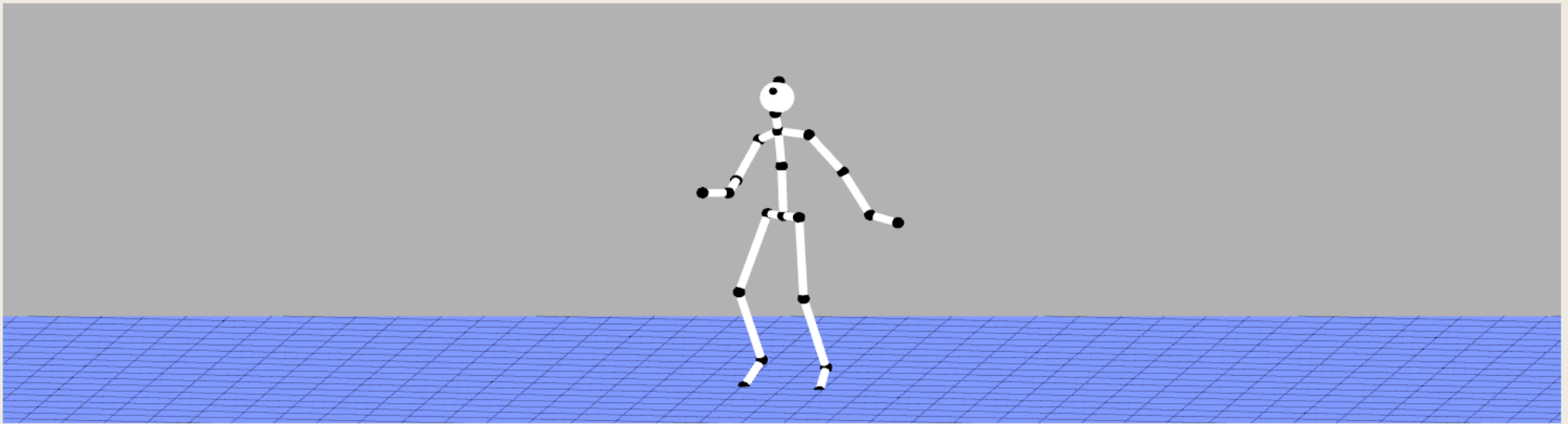
$$R'_4 = R'_{\text{head}} R_1^{-1} R_2^{-1} R_3^{-1}$$

# **Visualization**

# Motion Viewer

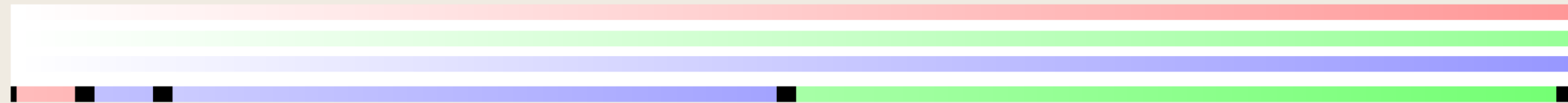


# Motion Player



add run frame period: 25 motion graph ▾

rw play pause ff stop



# Videos

<http://www.visgraf.impa.br/outgoing/videos-sib10/dmpm.mov>

<http://www.visgraf.impa.br/outgoing/videos-sib10/cgcl-hdv.mov>

# Acknowledgments

Thanks, Fernanda, *Gill Sans* rocks!