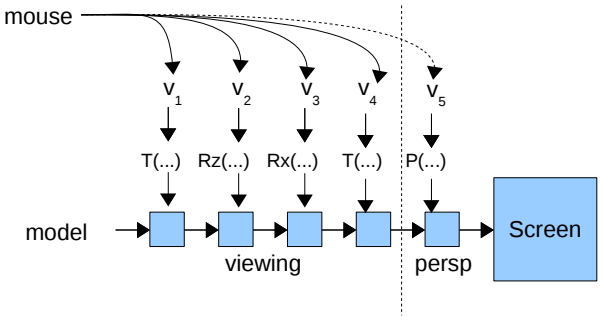
Interactive transformations

Interactive transformations

- Mouse interactions
  - update viewing/perspective variables (*)
  - force a redraw
- A redraw:
  - clears the screen
  - builds transformations from variables (*)
  - redraws scene
- (*) implemented by students in Project1



Building the viewing transformations

- Model sits on a turntable, with controls:
  - C : center of object
  - α : angle of turntable spin
  - β : angle of turntable forward/backward tilt
  - γ : perhaps angle of turntable spindle (up) projection
  - (t_x, t_y) : position across screen
  - d : viewing distance
- Transformations:
  - $T(t_x, t_y, d) \cdot R_z(\gamma) \cdot R_x(\beta) \cdot R_z(\alpha) \cdot T(-C)$

Building the perspective transformation

- Parameters are
  - r_x : ratio of screen half-width to viewing distance
  - r_y : ratio of screen half-height to viewing distance
  - f : front clipping distance
  - b : far clipping plane distance
- Transformation:
  - $P(r_x, r_y, f, b)$

Implementation via Graphics Library

- Viewing
  - scene.viewing.Identity()
  - scene.viewing.Translate(tx, ty, d)
  - scene.viewing.Rx(spin)
  - scene.viewing.Rz(tilt)
  - scene.viewing.Translate(-C)
- Perspective
  - scene.projection.Identity()
  - scene.projection.Perspective(rx, ry, f, b)