

CMSC427

Transformations:

Types (introduction)

Credit: slides 9+ from Prof. Zwicker

Transformations: outline

- Types of transformations
 - Specific: translation, rotation, scaling, shearing
 - Classes: rigid, affine, projective
- Matrix review
- Representing transformations
 - Unifying representation with homogeneous coordinates
 - Transformations represented as matrices
- Composing transformations
 - Sequencing matrices
 - Sequencing using OpenGL stack model
- Transformation examples
 - Rotating or scaling about a point
 - Rotating to a new coordinate frame

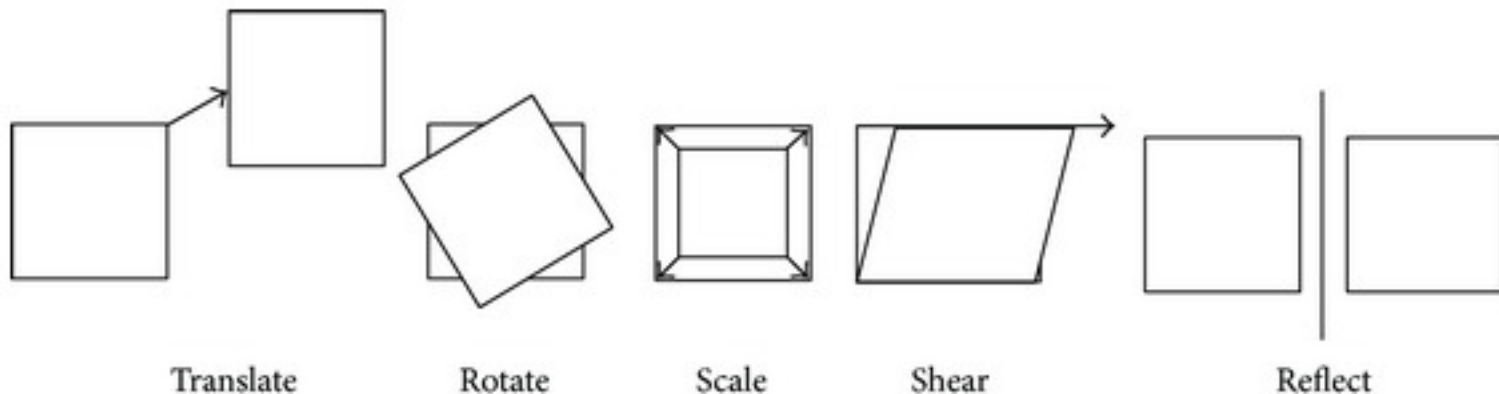
Classes of transformations

- Rigid

- Translate, rotate, uniform scale
- No distortion to object

- Affine

- Translate, rotate, scale (non-uniform), shear, reflect
- Limited distortions
- Preserve parallel lines



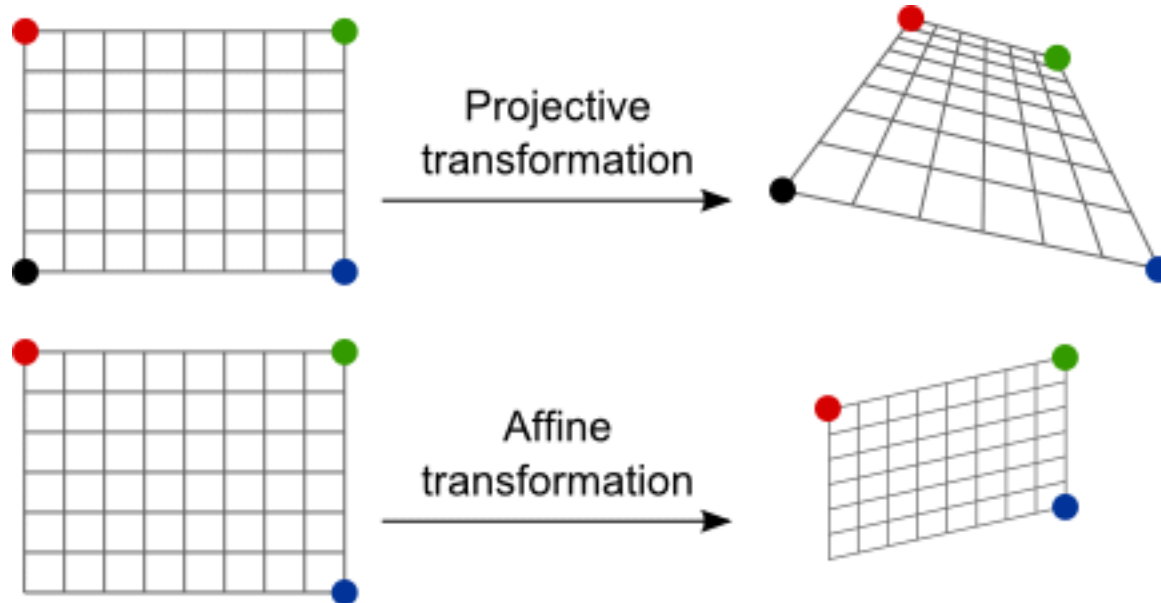
Classes of transformations

- Affine

- Preserves parallel lines

- Projective

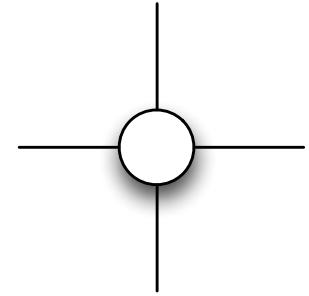
- Foreshortens
- Lines converge
- For viewing/rendering



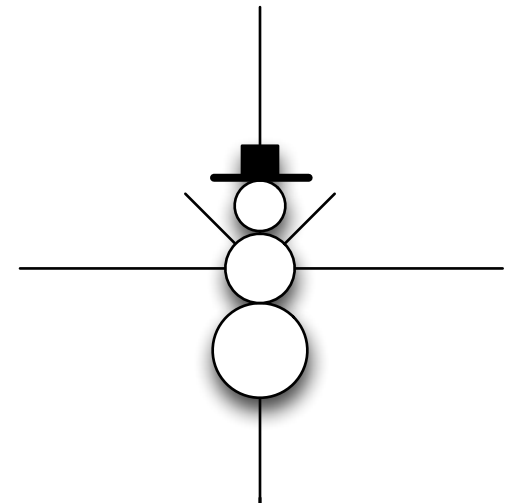
Modeling with transformations

- Create instance of object in object coordinate space
 - Create circle at origin
- Transform object to world coordinate space
 - Scale by 1.5
 - Move down by 2 unit
- Do so for other objects
 - Two rects make hat
 - Three circles make body
 - Two lines make arms

- Object coordinate space



- World coordinate space



Classes of transformations: summary and applications

- Affine
 - Reshape, size object
- Rigid
 - Place, move object
- Projective
 - View object
 - *Later ...*
- *Non-linear, arbitrary*
 - *Twists, pinches, pulls*
 - *Not in this unit*

