

Computer Graphics: CO 303

Lecture 1

# Draconifor's

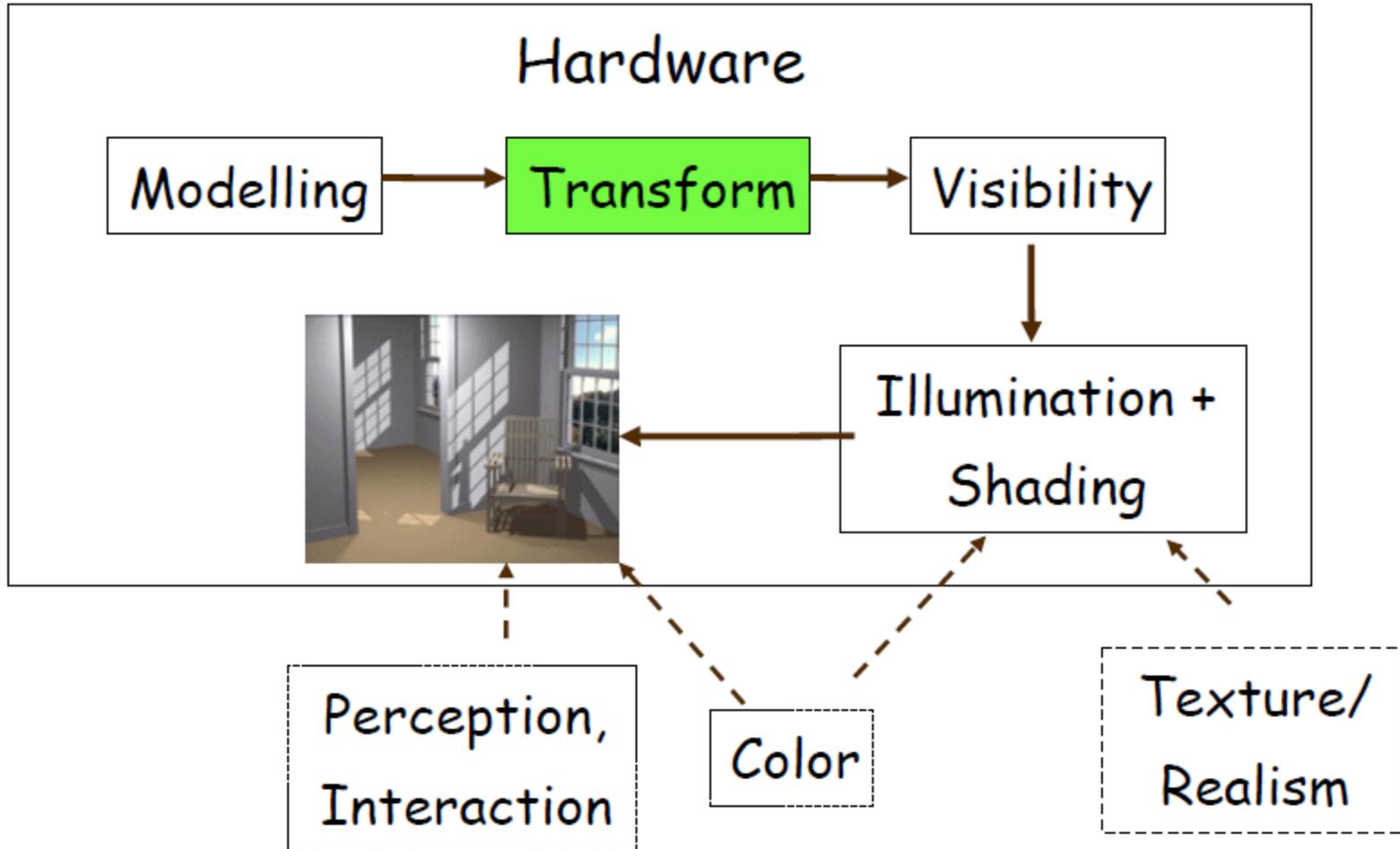
Transformations in 2-D, Translation

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# Transformations

- “...changing something into something else,  
*of course, it's supposed to be very difficult.*”  
*- Hermione Granger, muggle-born witch.*
- But, it's easy!
- Mapping between values in a range and domain set.

# Graphics pipeline



Source: Torsten Moller, "2D transformation"

# Why do we need Transformations

- Moving objects in space (on screen)
- Specifying camera view (in 3D space)
- Mapping model space to world space to camera space to screen space
- ...
- ...
- ...

# Most Basic Transformations

- Translation
- Scaling
- Rotation
- Shear
- *Perspective transform, projection, ...*

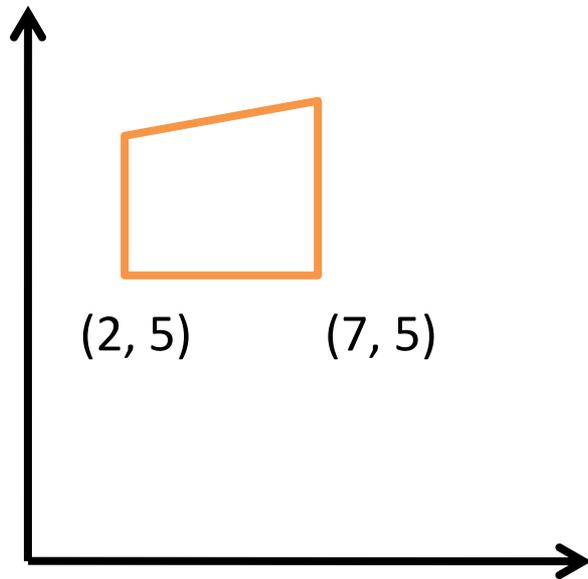
# Types of Transformations

- Rigid body Transformation: Preserves length and angles
- Affine Transformation: Any transformation that preserves Collinearity and Ratios.
- Free-Form transformations: *kuch bhi chalega!*

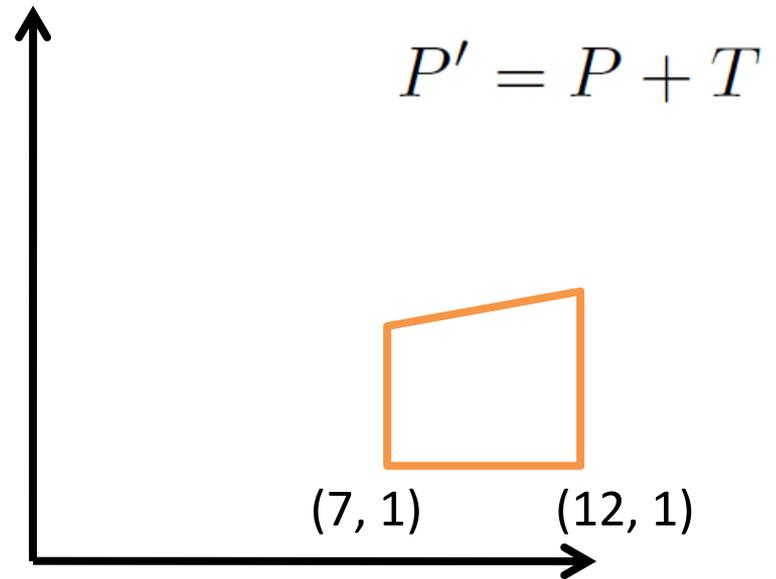
# Translation

- Moving an object is called a translation.
- We translate a point by adding to the  $x$  and  $y$  coordinates, respectively, the amount the point should be shifted in the  $X$  and  $Y$  directions.

# Translation



Before transformation



After transformation

$$\begin{aligned}x' &= x + d_x \\y' &= y + d_y\end{aligned} \quad \begin{bmatrix} x' \\ y' \end{bmatrix} = \begin{bmatrix} x \\ y \end{bmatrix} + \begin{bmatrix} d_x \\ d_y \end{bmatrix}$$

THANKS!