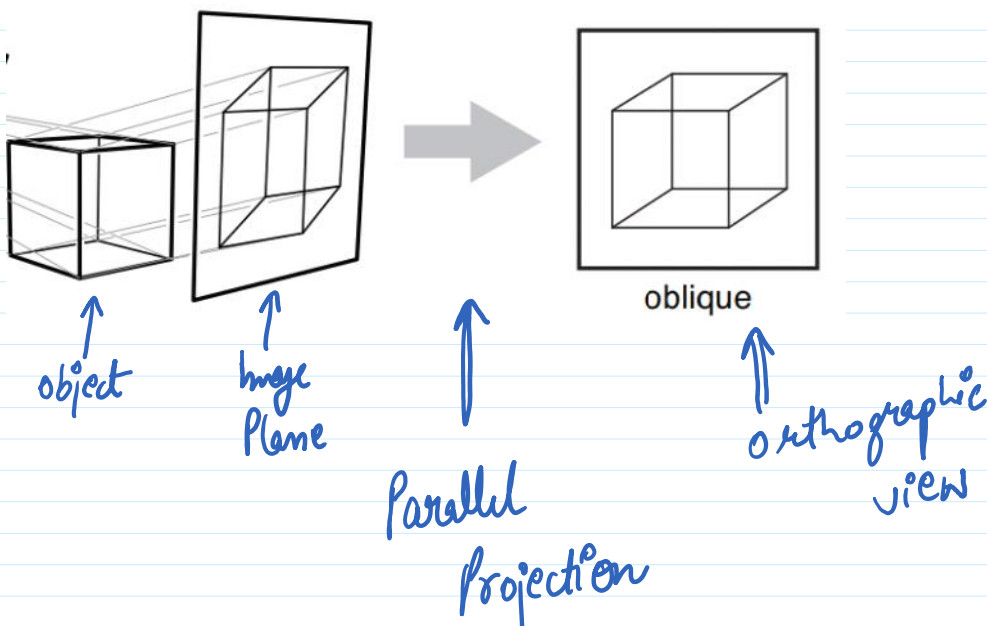


Image :- Representation of 3D object/scene with a 2D drawing or painting.

① Parallel Projection :-

3D points are mapped to 2D along a direction until they hit the image plane.

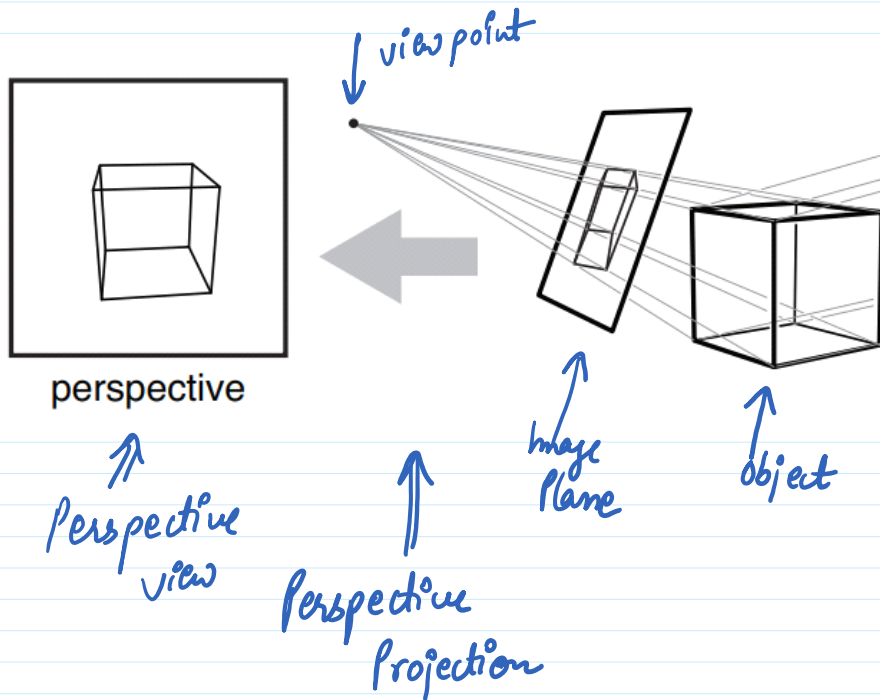


Used in mechanical and architectural drawings.
 → keep lines parallel
 → preserves the size and shape

In real life, objects are look smaller as they get farther away.

② Perspective Projection :-

- parallel lines does not appear parallel after a certain distance
- eyes / cameras do not collect light from a single viewing direction, they collect light passing through a "viewpoint".



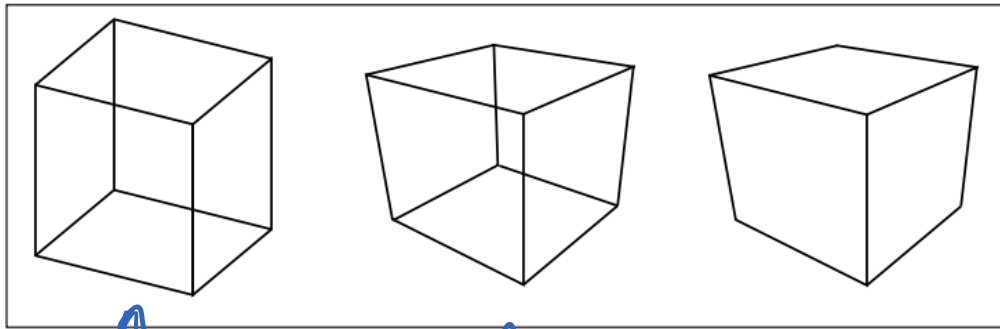
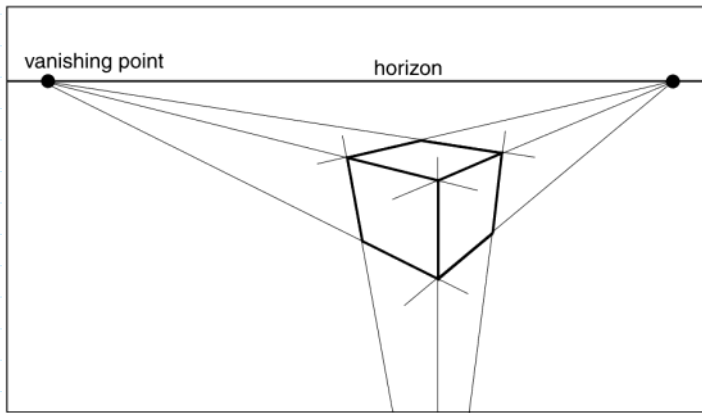
Vanishing Points :- The point where parallel lines meet in a perspective projection.



Every set of parallel lines has its own

vanishing points.

Parallel horizontal lines will meet at a point on the horizon.



Orthographic
Projection

Perspective
Projection

Perspective
View
(No hidden)
lines

Viewing Transformations :

Mapping 3D locations represented
as (x, y, z) coordinates in the
world coordinate system \rightarrow

image coordinates (pixels)

Depends on different things:-

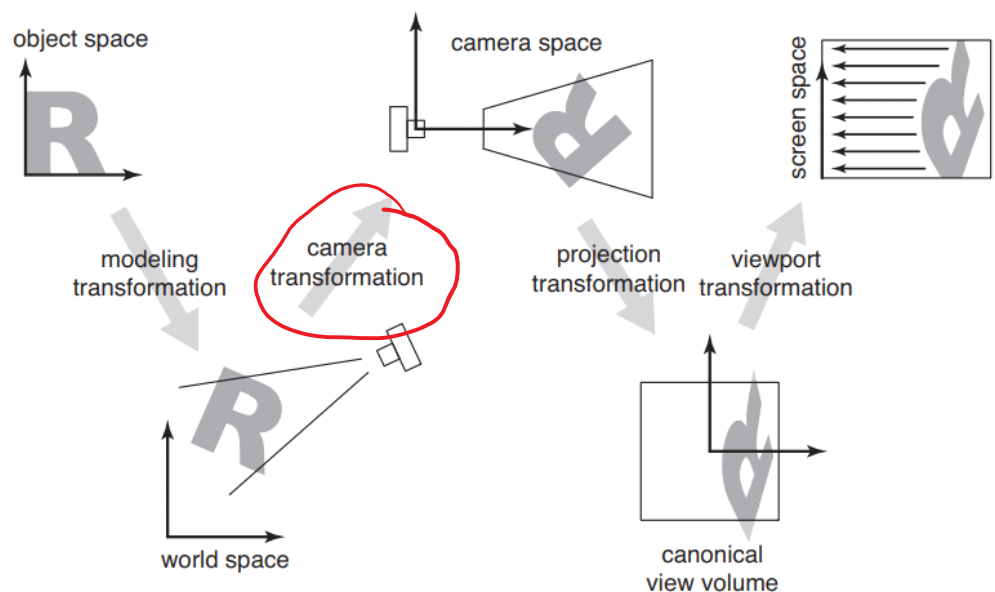
- camera position and orientation
- type of projection
- resolution of image
- field of view.

Three sequence of transformations:-

① Camera Transformation:-

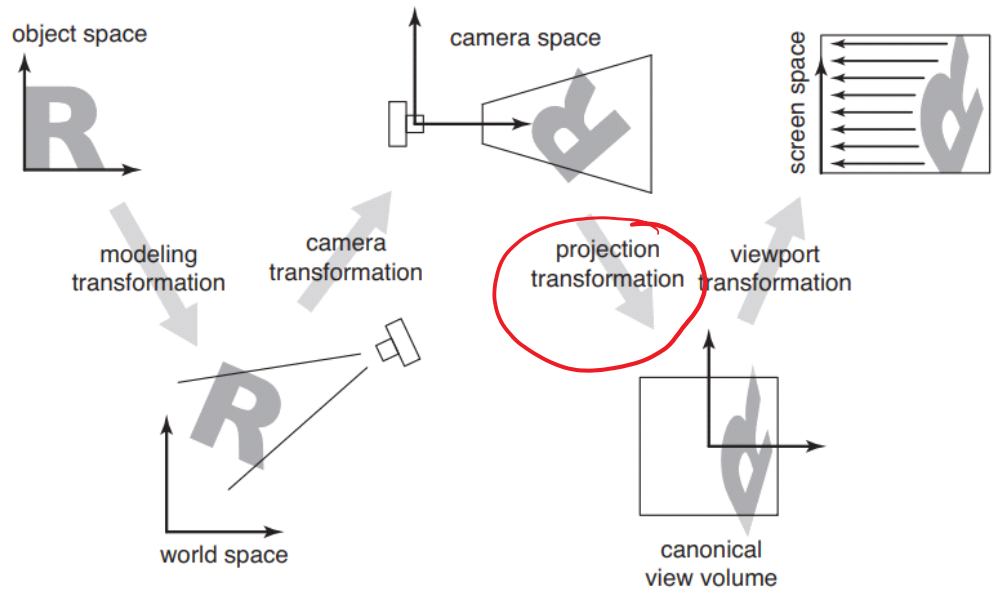
Places the camera at the origin in a convenient orientation.

Depends only on the position and orientation of the camera.



② Projective Transformation:-

projects points from camera space. Depends on type of desired projection.



③ Viewport Transformation :- Maps this projection to the desired rectangle in the pixel coordinates.

Depends on the size and position of the output image.

“ Define vanishing points and horizon.”
How these two related?