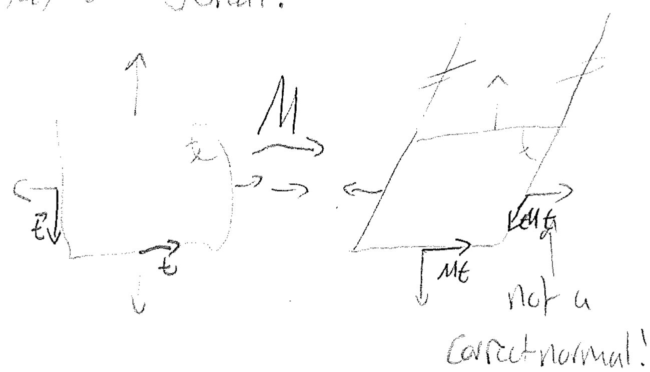
15.1 ~~14.4~~

Transforming Normals

Affine: parallel stays parallel

orthogonal does not stay orthogonal.



If we stored tangent vectors, t

they'd remain correct:

$$Mt$$

Want a matrix N s.t. Nn is orthogonal to Mt

$$\vec{n}^T \vec{t} = 0$$

$N\vec{n}_{orig}$ $\quad$ $M\vec{t}_{orig}$

Let's play some algebra tricks:

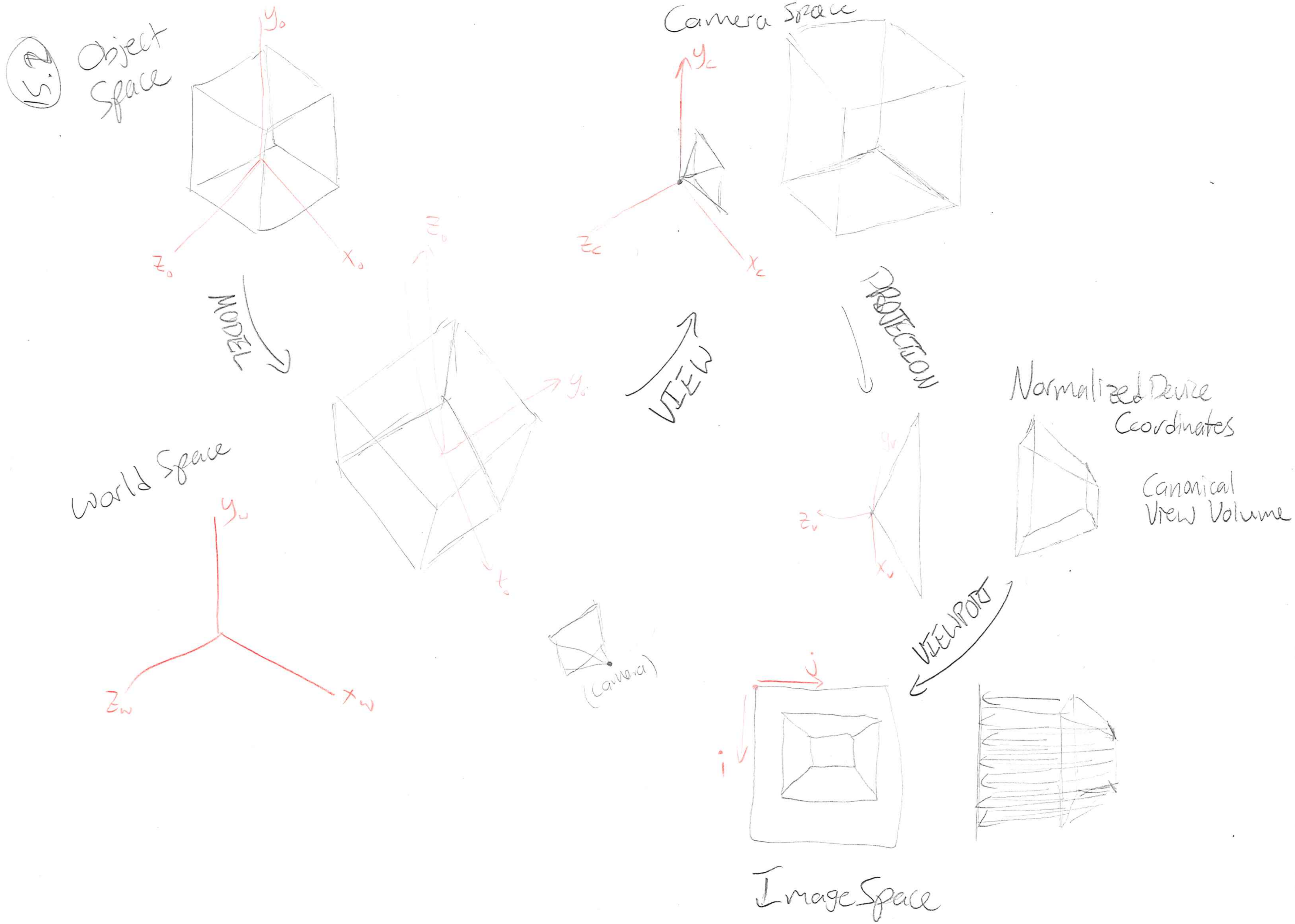
$$\vec{n}^T \vec{t} = \vec{n}^T \underset{\text{identity}}{I} \vec{t}$$

$$= \vec{n}^T M^{-1} M \vec{t} = 0$$

$$= \underbrace{(\vec{n}^T M^{-1})}_{\text{These are the normals we want}} (M\vec{t}) = 0$$

Transpose it: $M^{-T}\vec{n}$ is orthogonal to the transformed tangent vectors.

To get transformed normals, multiply them by the inverse transpose of the transformation matrix.



15.2
Object Space
y_o
z_o
x_o
MODEL
World Space
y_w
z_w
x_w
z_o
y_o
x_o
(camera)
VIEW
Camera Space
y_c
z_c
x_c
PROJECTION
y_v
z_v
x_v
Normalized Device Coordinates
Canonical View Volume
VIEWPORT
j
i
Image Space