

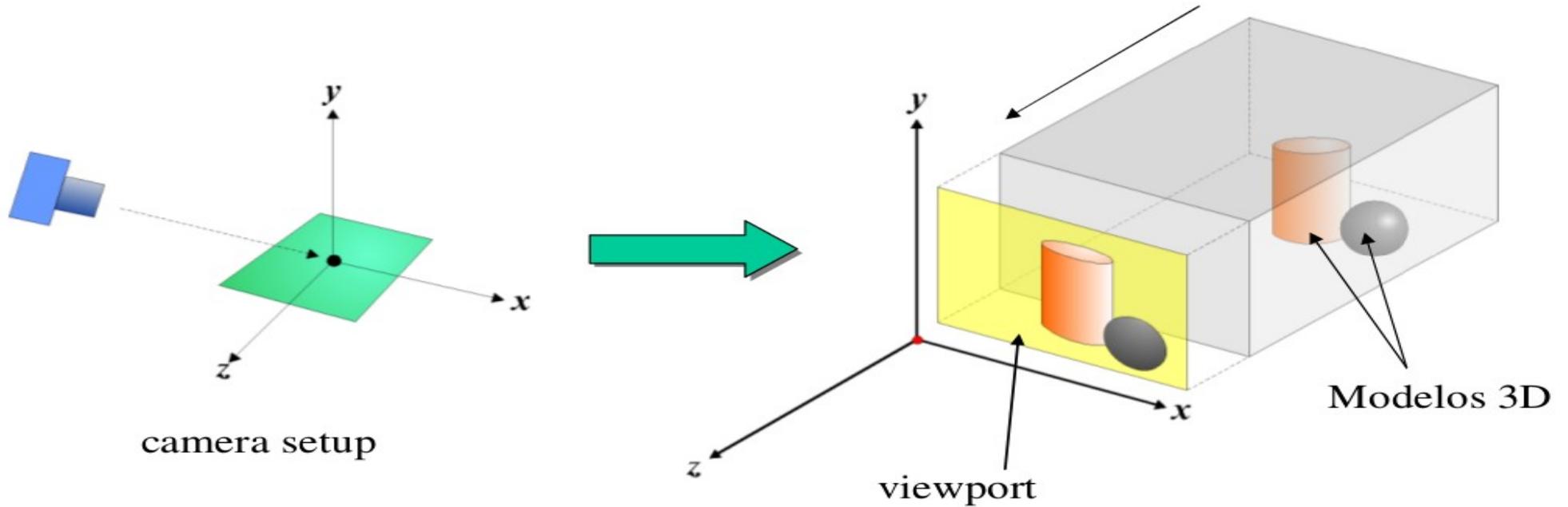
Câmera e Transformação Projetiva

Transformação Projetiva



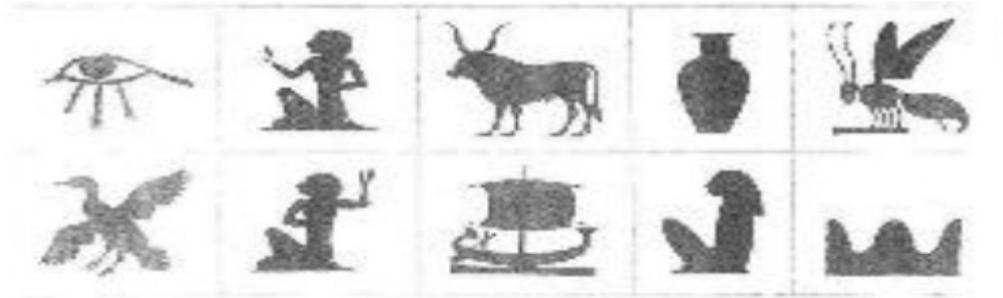
Transformação Projetiva

- Projeção



Transformação Projetiva

- Projeção
 - Representação de objetos 3D em meios 2D



Transformação Projetiva

- Aprimoramentos



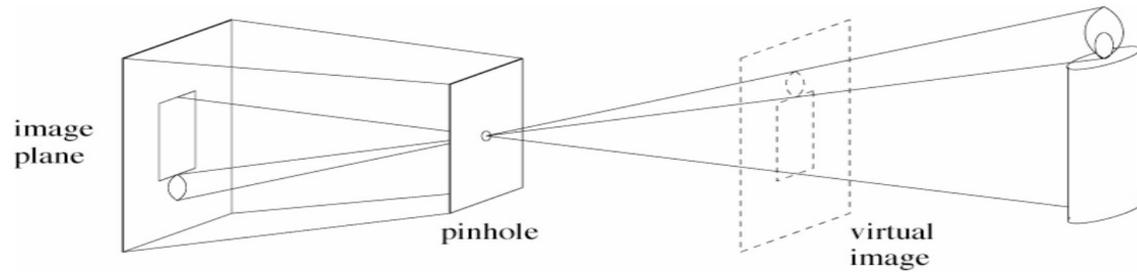
<http://www.stedwards.edu/hum/randle/s32/SSgotpint/FrameSet.htm>



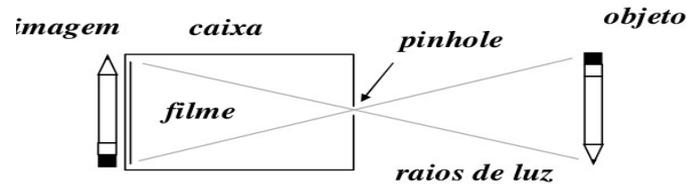
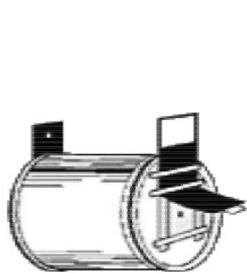
http://www.personal.us.es/jcordero/DISTANCIA/cap_09.htm

Câmeras Fotográficas

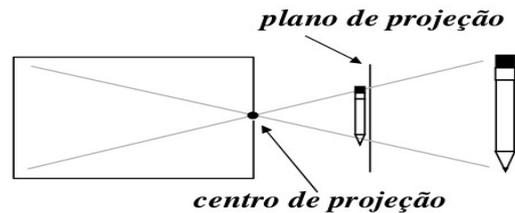
- Pinhole



Câmera



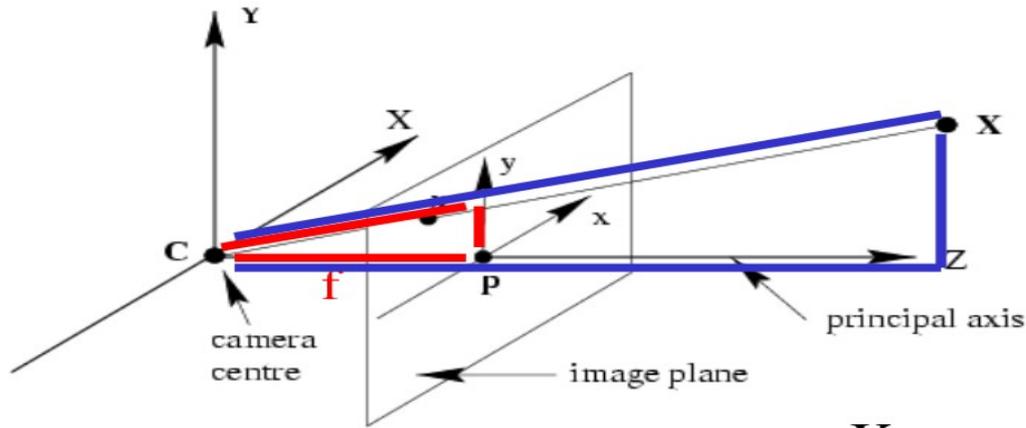
Projeção cônica



Câmara escura - Leonardo da Vinci -1545

Projeções Geométricas

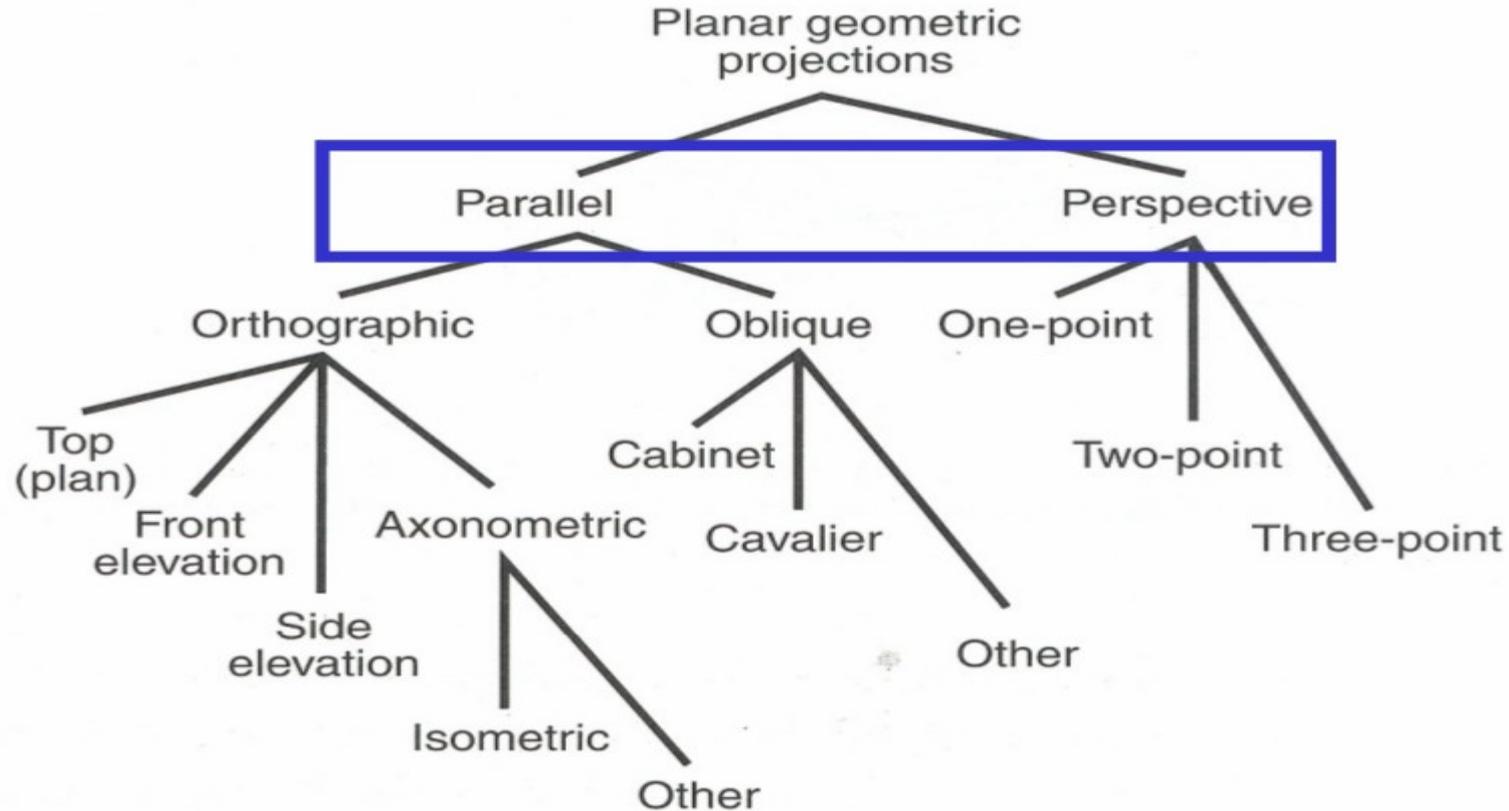
- Projeção cônica



$$x = f \frac{X}{Z}, \quad y = f \frac{Y}{Z}$$

$$p = [x, y]^T \Leftrightarrow p = [x, y, f]^T$$

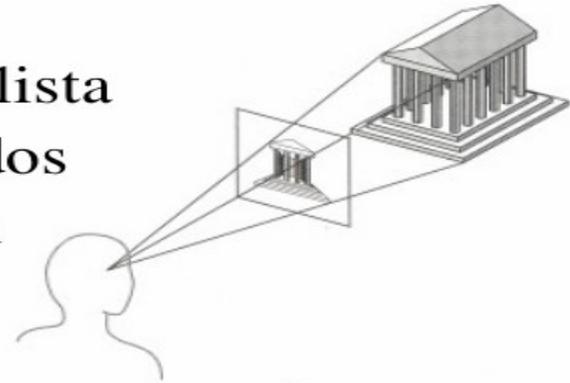
Projeções Geométricas



Projeções Geométricas

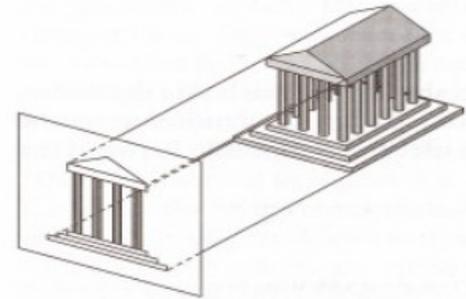
- **Perspectiva**

- + Tamanho varia inversamente à distância: realista
- Distância e ângulos (em geral) não preservados
- Linhas paralelas (em geral) não permanecem paralelas



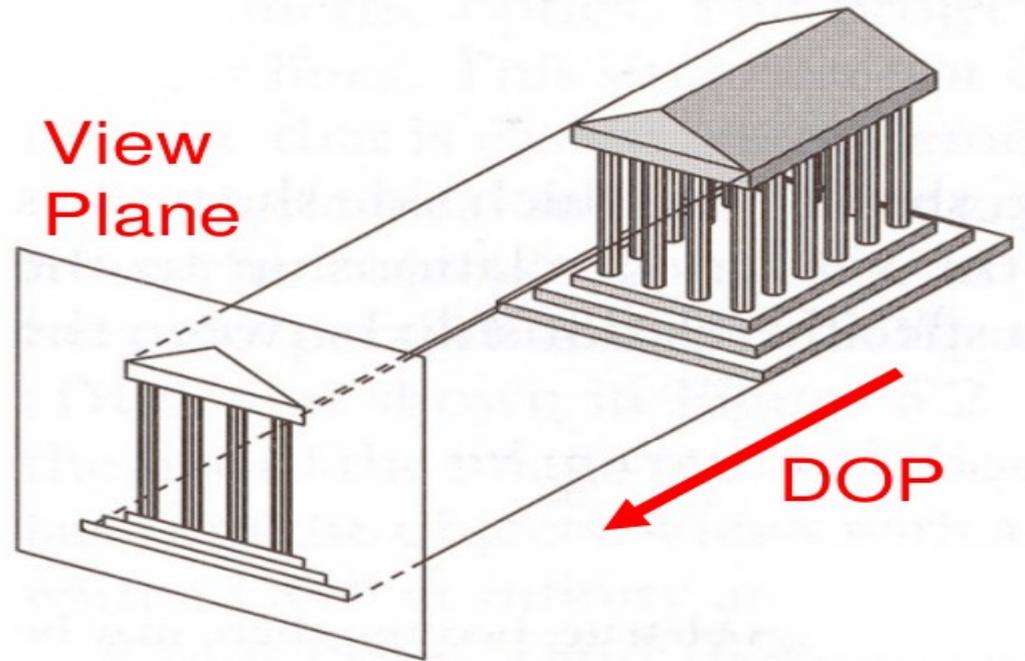
- **Paralela**

- + Boa para medições precisas
- + Linhas paralelas permanecem paralelas
- Ângulos (em geral) não são preservados
- Aparência menos realista

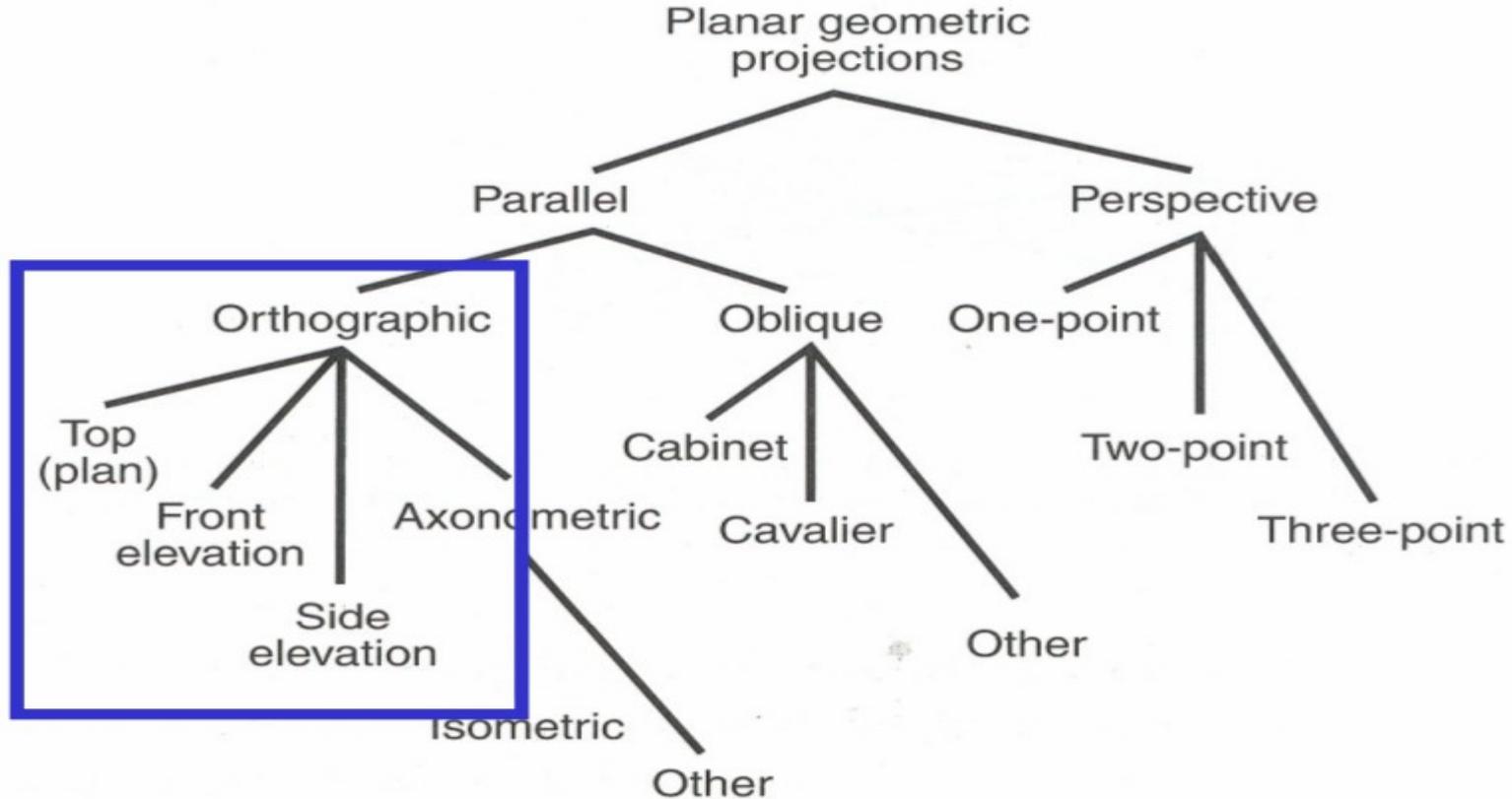


Projeção Paralela

- Centro de Projeção no infinito
- DOP → Direção de Projeção
 - Mesma para todos os pontos

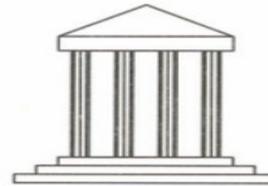
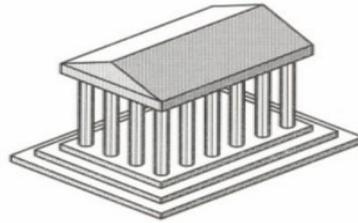


Projeções Geométricas

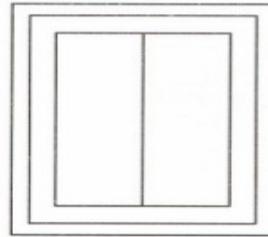


Projeções Ortográficas

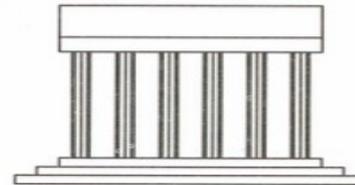
- DOP
 - Perpendicular ao view plane



Front



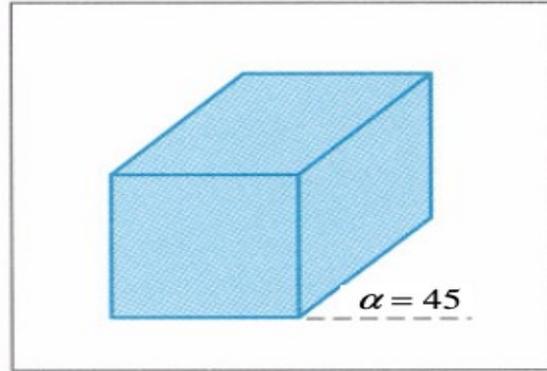
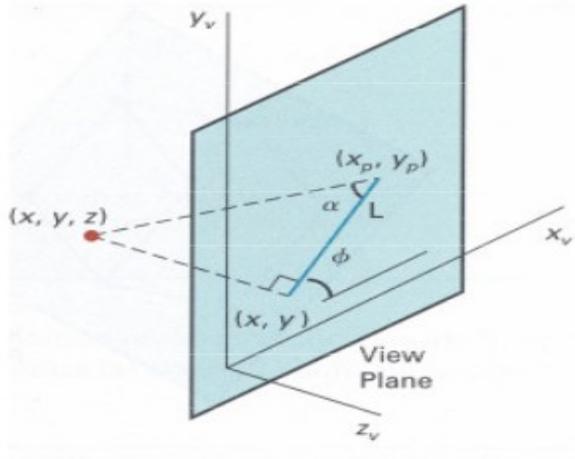
Top



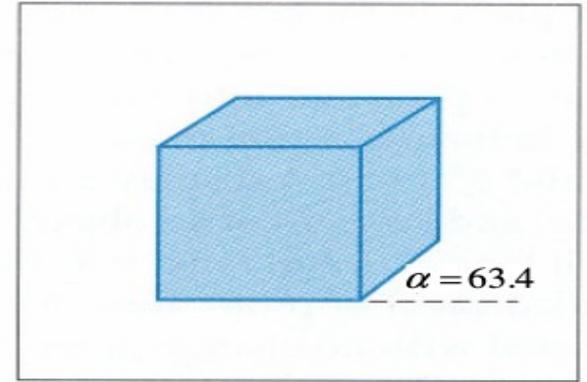
Side

Projeções Oblíquas

- DOP não é perpendicular ao view plane



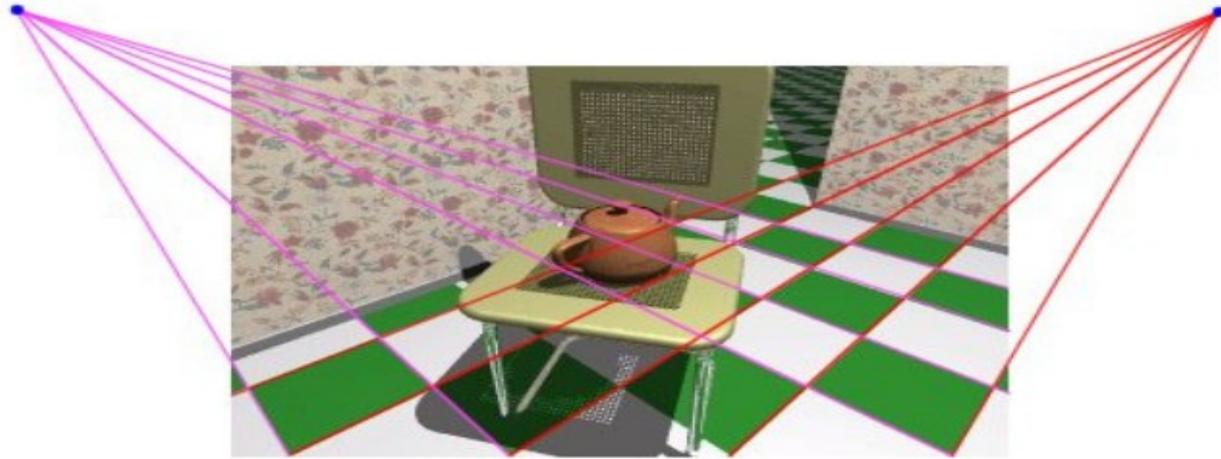
Cavalier
(DOP $\alpha = 45^\circ$)
 $\tan(\alpha) = 1$



Cabinet
(DOP $\alpha = 63.4^\circ$)
 $\tan(\alpha) = 2$

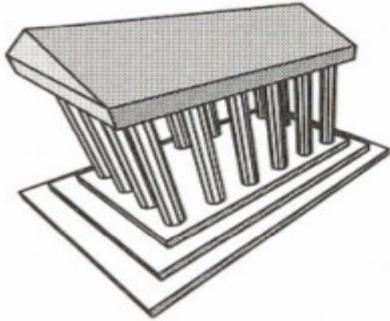
Projeção Perspectiva

- Objetos mais próximos parecem maiores
- Linhas paralelas convergem a 1 único ponto

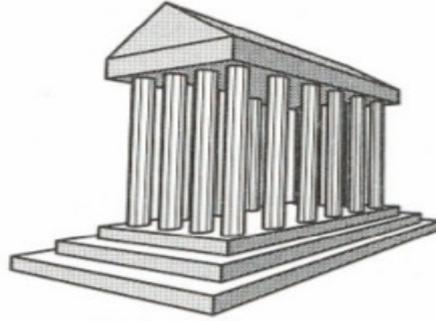


Projeção Perspectiva

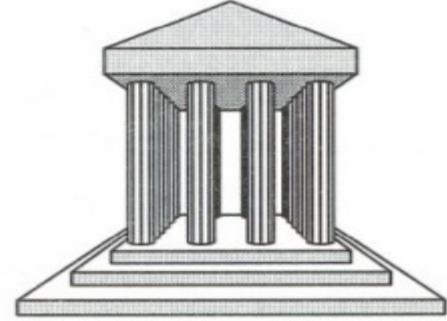
- Quantos pontos de fuga?



3-Point
Perspective

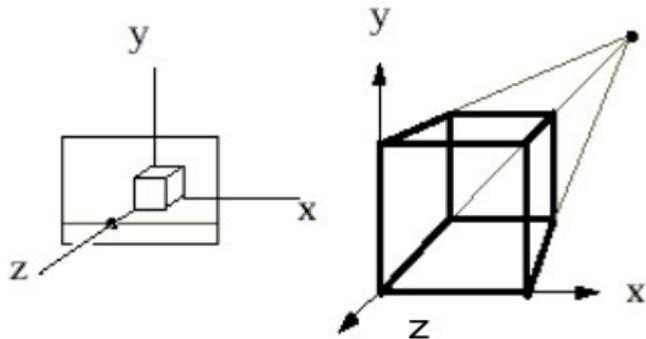


2-Point
Perspective

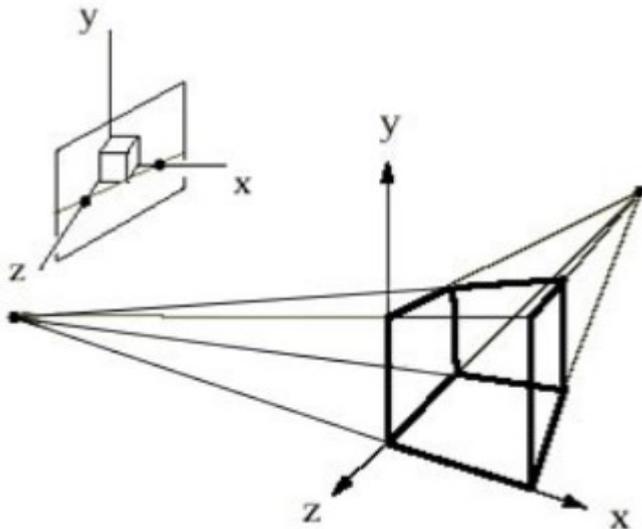


1-Point
Perspective

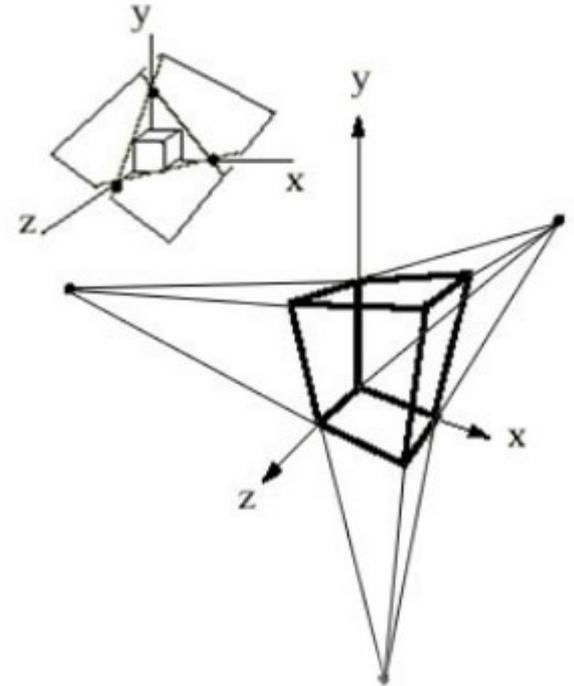
Projeção Perspectiva



1 ponto de fuga



2 pontos de fuga



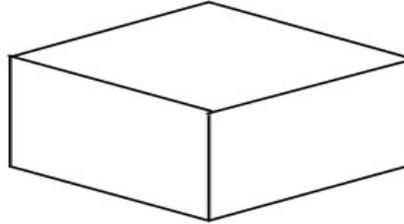
3 pontos de fuga

Projeções de um cubo

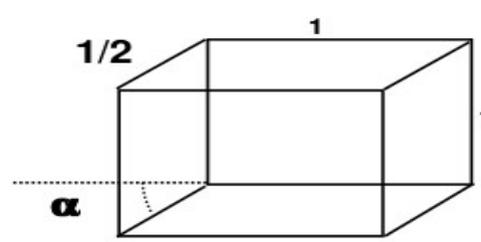
• Paralelas



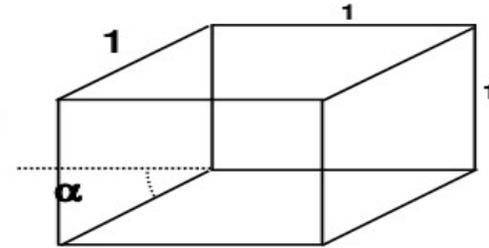
planta ou elevação



iso-métrica

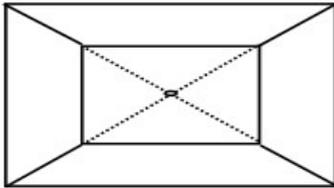


Cabinete
($\alpha=45$ ou 30)

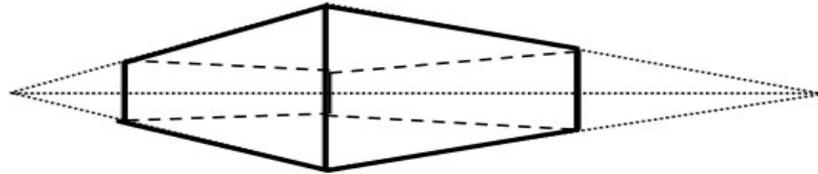


Cavaleira
($\alpha=45$ ou 60)

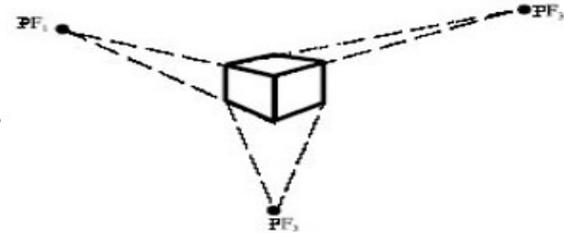
• Cônicas



1 pto de fuga



2 ptos de fuga



3 ptos de fuga