



Anamorphic projections

Van Mai Nguyen Thi

Joint Senior Project: Mathematics & Computer Science
Advisers: Keith O'Hara and Jim Belk

An **anamorphosis** is an image that is intentionally distorted so that the original image can be seen only when looked at from a certain perspective, or using a special device, for example a mirror.

Examples



The Ambassadors
by Hans Holbein,
1533

Examples



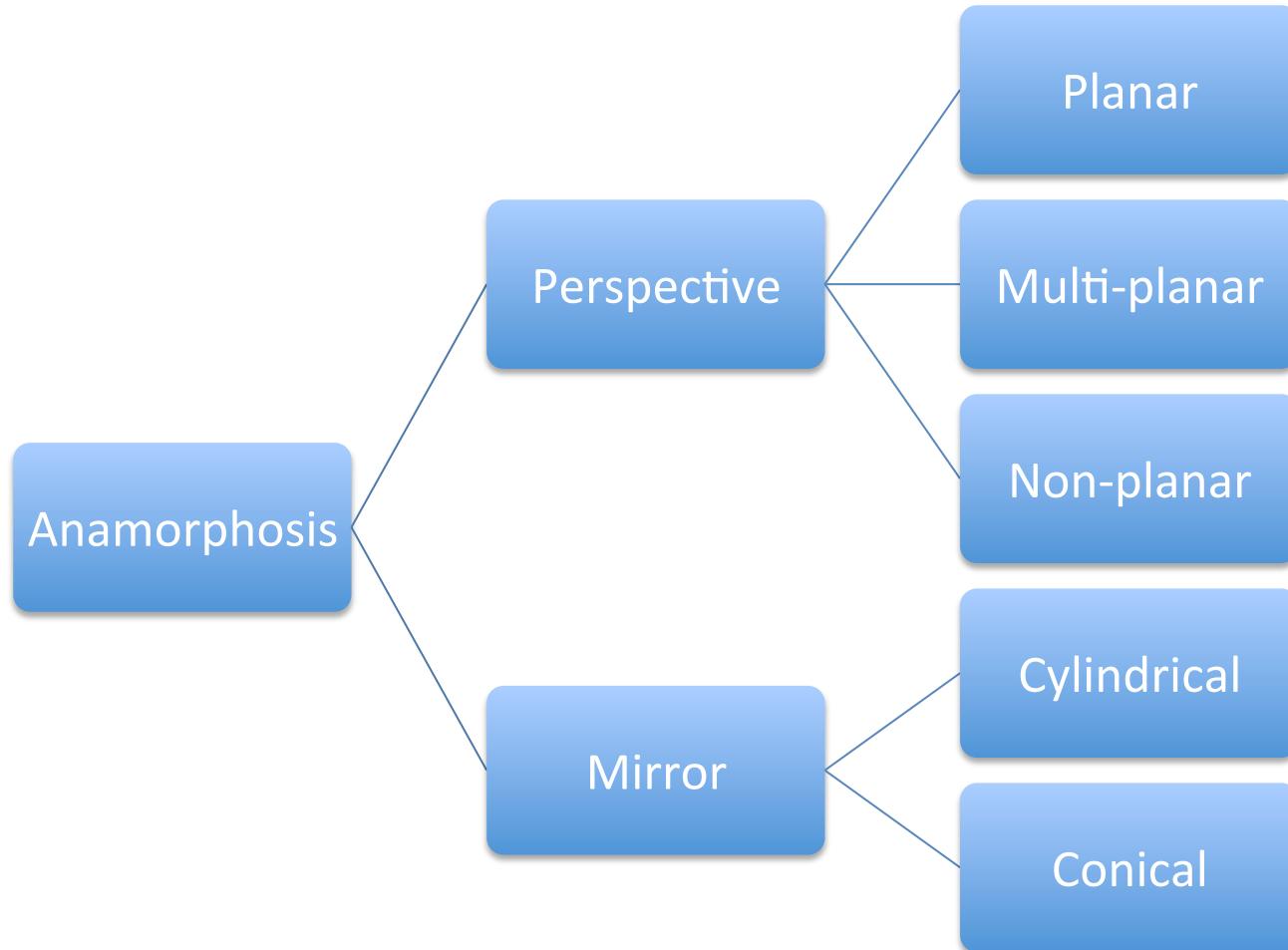
The Ambassadors
by Hans Holbein,
1533

Examples



Make Poverty History by Julian Beever

Types of anamorphosis



Multi-planar anamorphosis

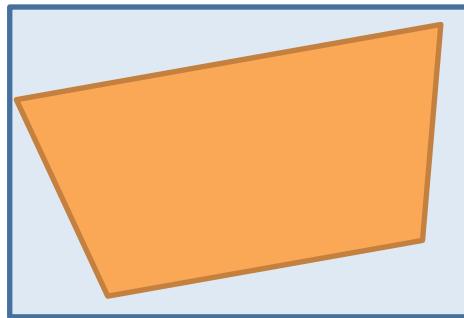
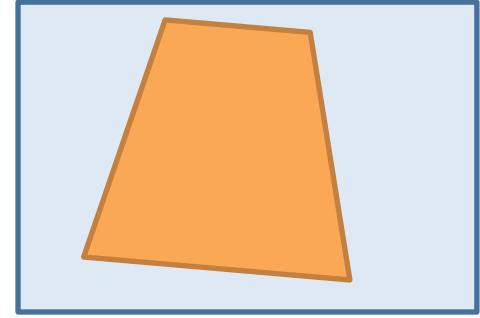


*Anamorphic art in the
Toronto subway
by Panya Clark Espinal*

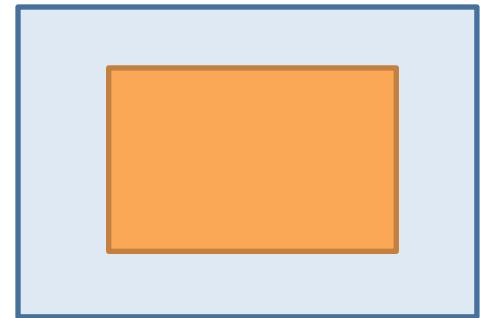
Homography mapping



$$H \rightarrow$$



$$\leftarrow H^{-1}$$

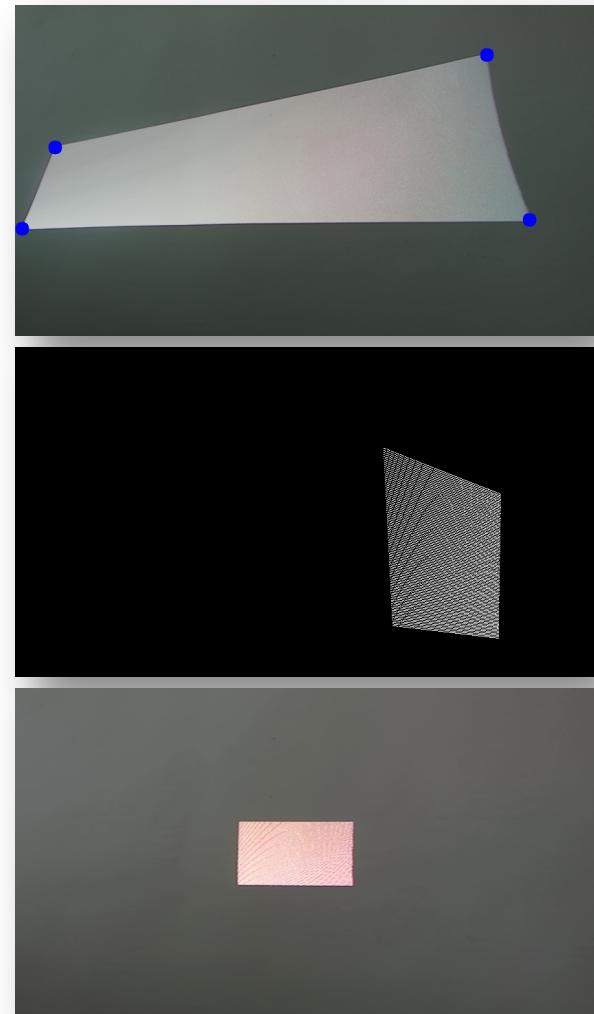


$$H = \begin{pmatrix} p_1 & p_2 & p_3 \\ p_4 & p_5 & p_6 \\ p_7 & p_8 & p_9 \end{pmatrix}$$

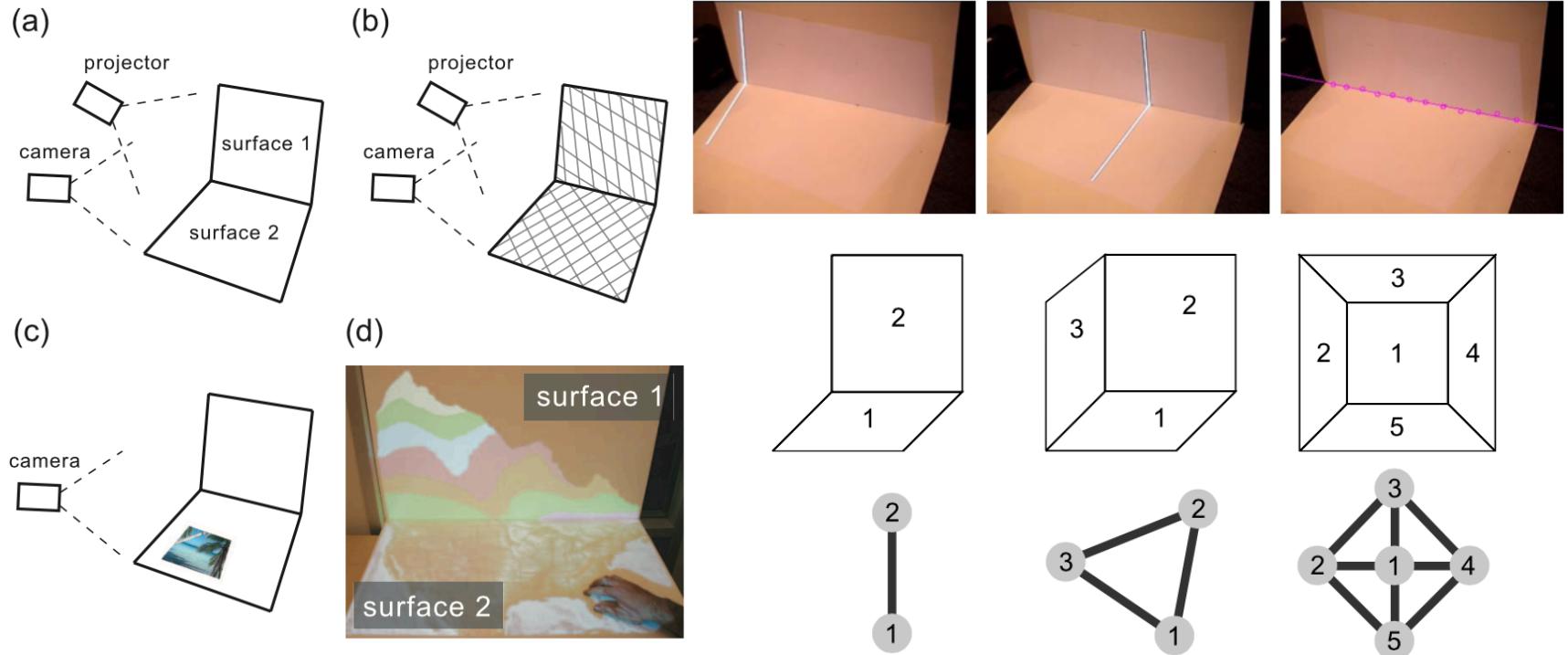
$$H \begin{pmatrix} x \\ y \\ 1 \end{pmatrix} = \begin{pmatrix} x' \\ y' \\ \omega \end{pmatrix}$$

Estimating plane anamorphosis

1. Project a pattern
2. Find at least 4 common points
3. Estimate H using the least squares method
4. Use H^{-1} to pre-warp the original image



Detecting multi-planar surfaces

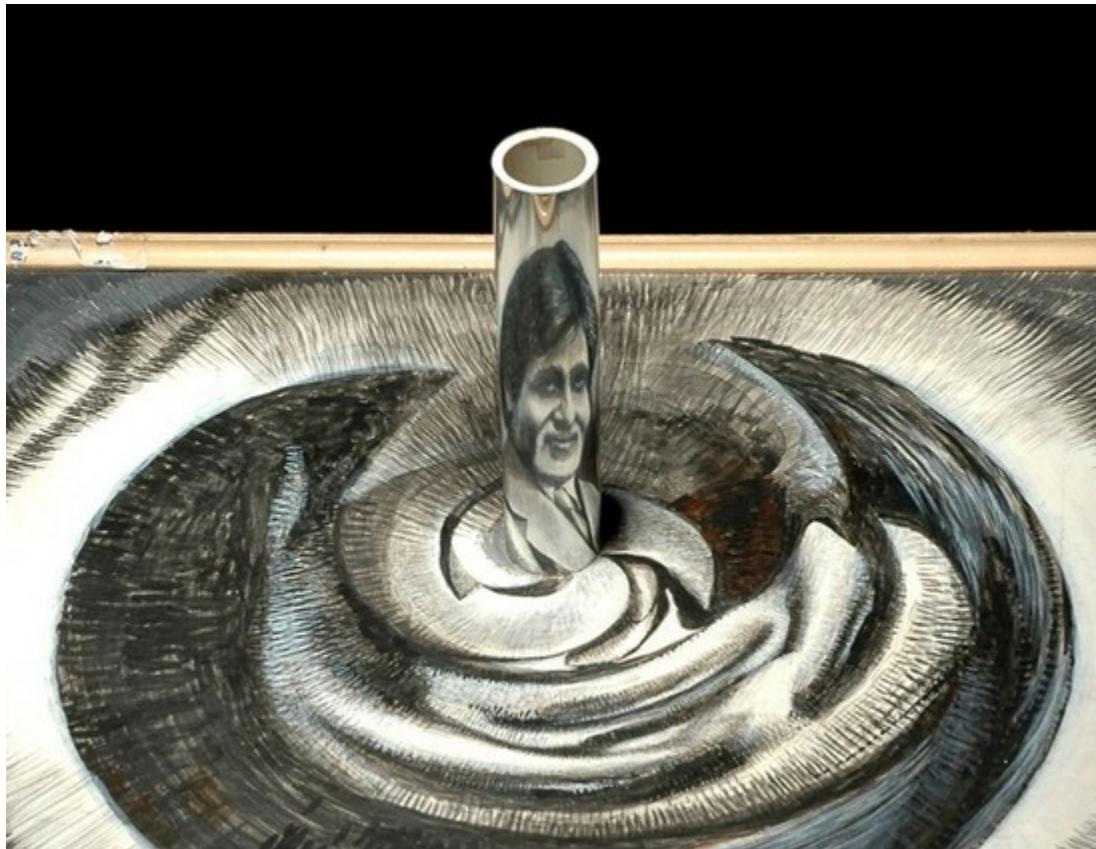


Ashdown M., et. al. *A Flexible Projector-Camera System for Multi-Planar Displays*, Proceedings of IEEE Computer Society Conference on CVPR, volume II, 2004

What I plan to do...

- Automatically generate anamorphic images that can be projected on more complex surfaces
- Given multiple viewers, generate an anamorphic image that is optimal for all viewers.
- Explore other types of anamorphosis

Cylindrical mirror anamorphosis



A drawing
by Awtar Singh Virdi