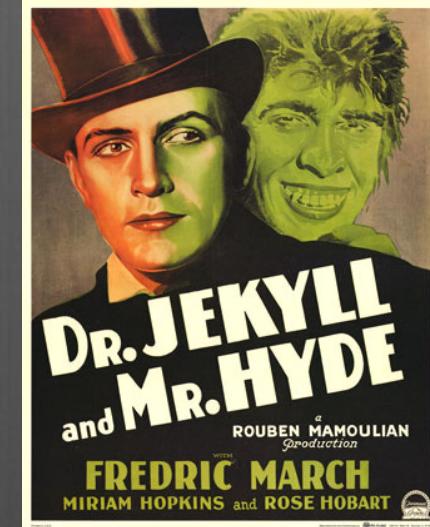# Image Metamorphosis

Andrew Moran

High School Conference

10/31/2013

Image Morphing

- **Morphing** is turning one image into another

- Common Uses

- Transition seems **fast**

Harry Potter and the Sorcerer's Stone.

Professor McGonagall

Professor McGonagall

Professor McGonagall

Professor McGonagall

Professor McGonagall

Professor McGonagall

Cross-Dissolve

First Image

Last Image

Cross-Dissolve

Transparency   0 %   50 %

First Image

Last Image

Cross-Dissolve

Transparency   0 %   50 %

First Image

Last Image

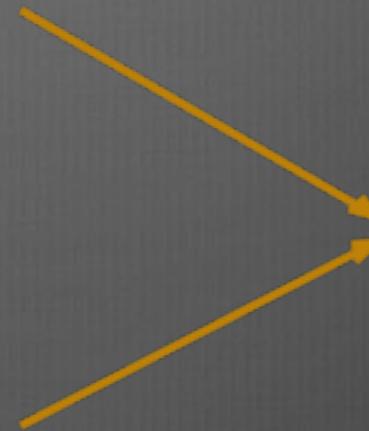Middle Image

Cross-Dissolve

Transparency   0%   50 %

First Image

Last Image

Middle Image

Does this look right?

What's Wrong with this Image?

What's Wrong with this Image?

Problem

Many features don't match
   - Eyes
   - Chin
   - Mouth
   - Nose
   - Eyebrows

What's Wrong with this Image?

Problem

Many features don't match
- Eyes
- Chin
- Mouth
- Nose
- Eyebrows

Approach
- Specify features of interest

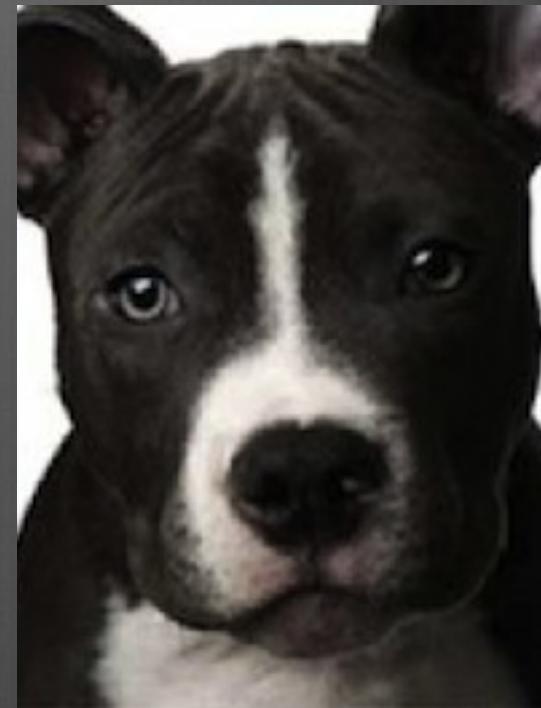# Image Warping

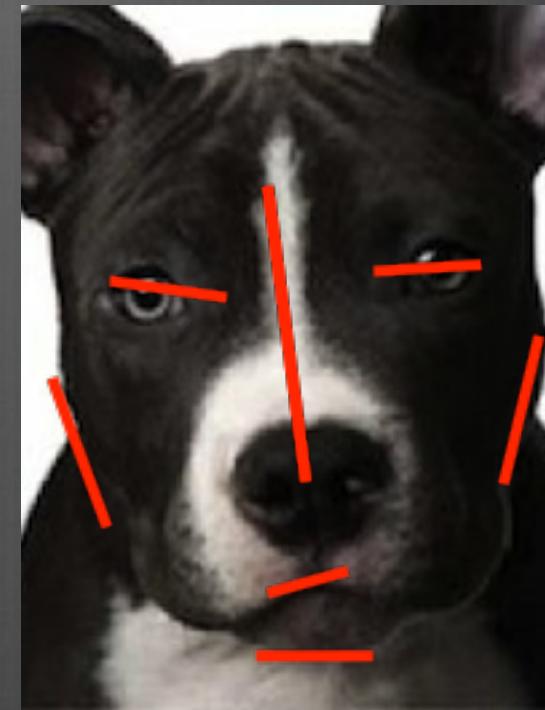- **Warping** changes the shape of an image

Image Warping

- **Warping** changes the shape of an image

- Provide important line segments

Image Warping

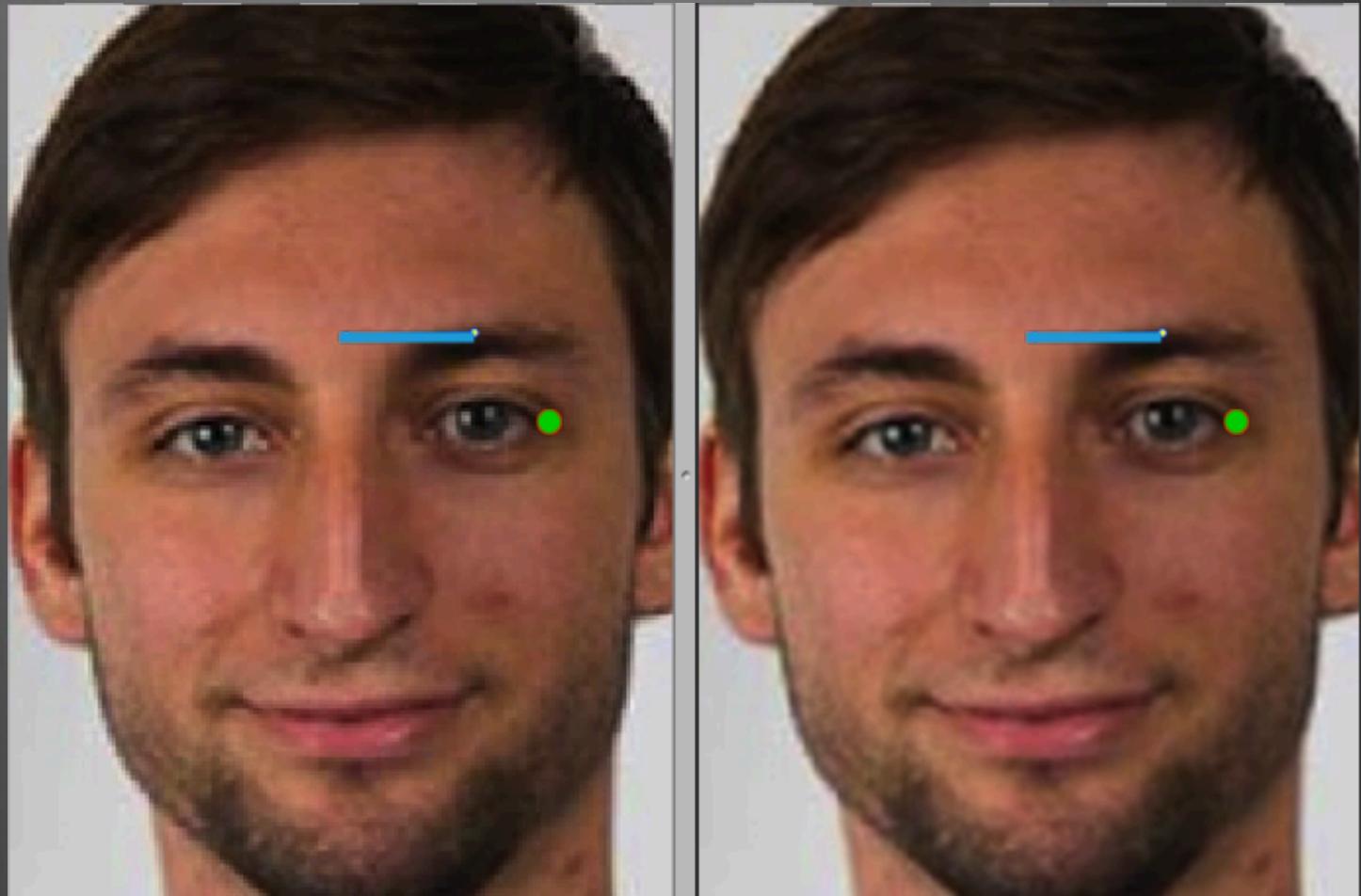- **Warping** changes the shape of an image

- Provide important line segments

Image Warping

- **Warping** changes the shape of an image

- Provide important line segments

How do you reshape for each pixel

What Factors Effect Each Pixel?
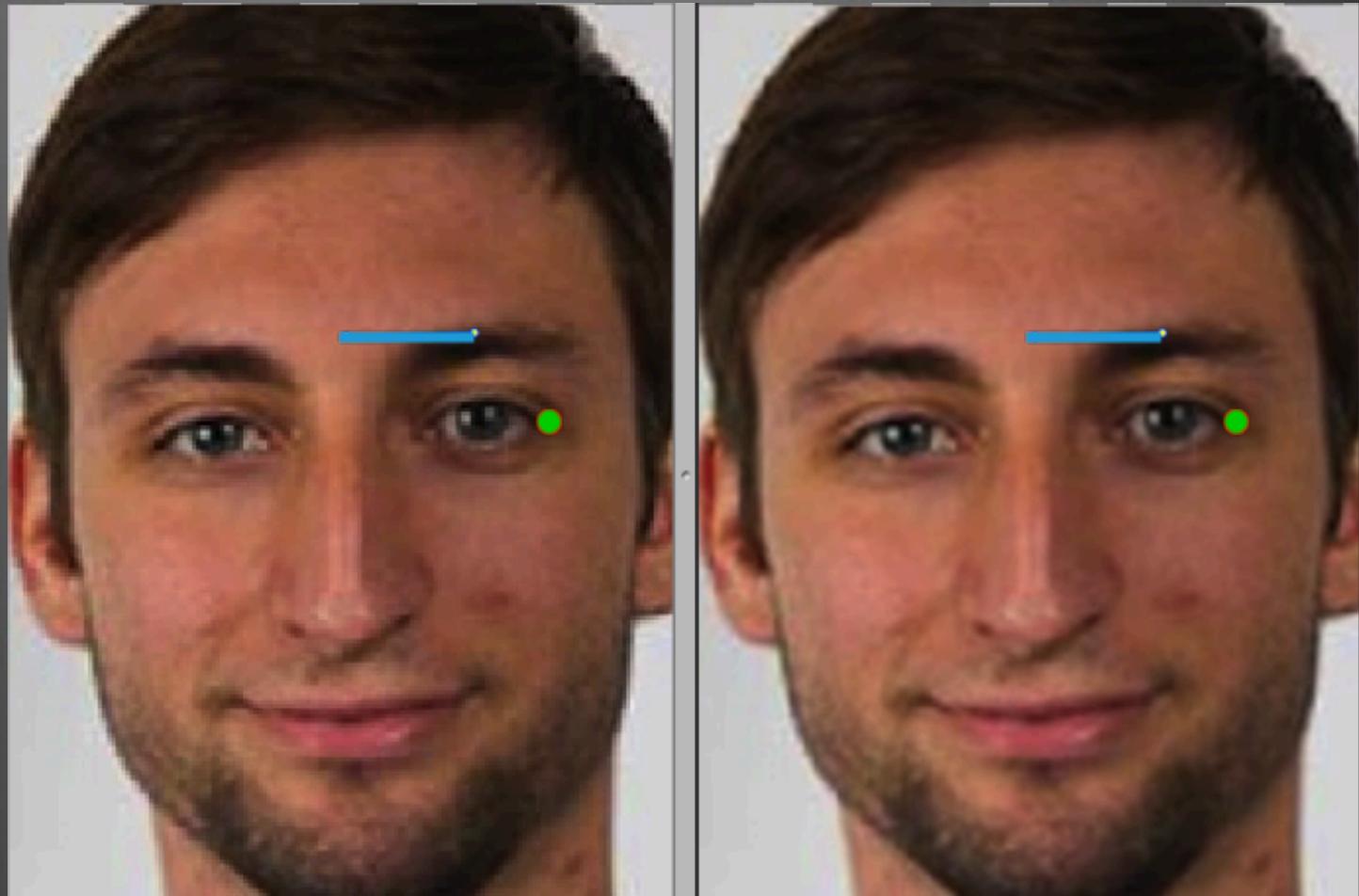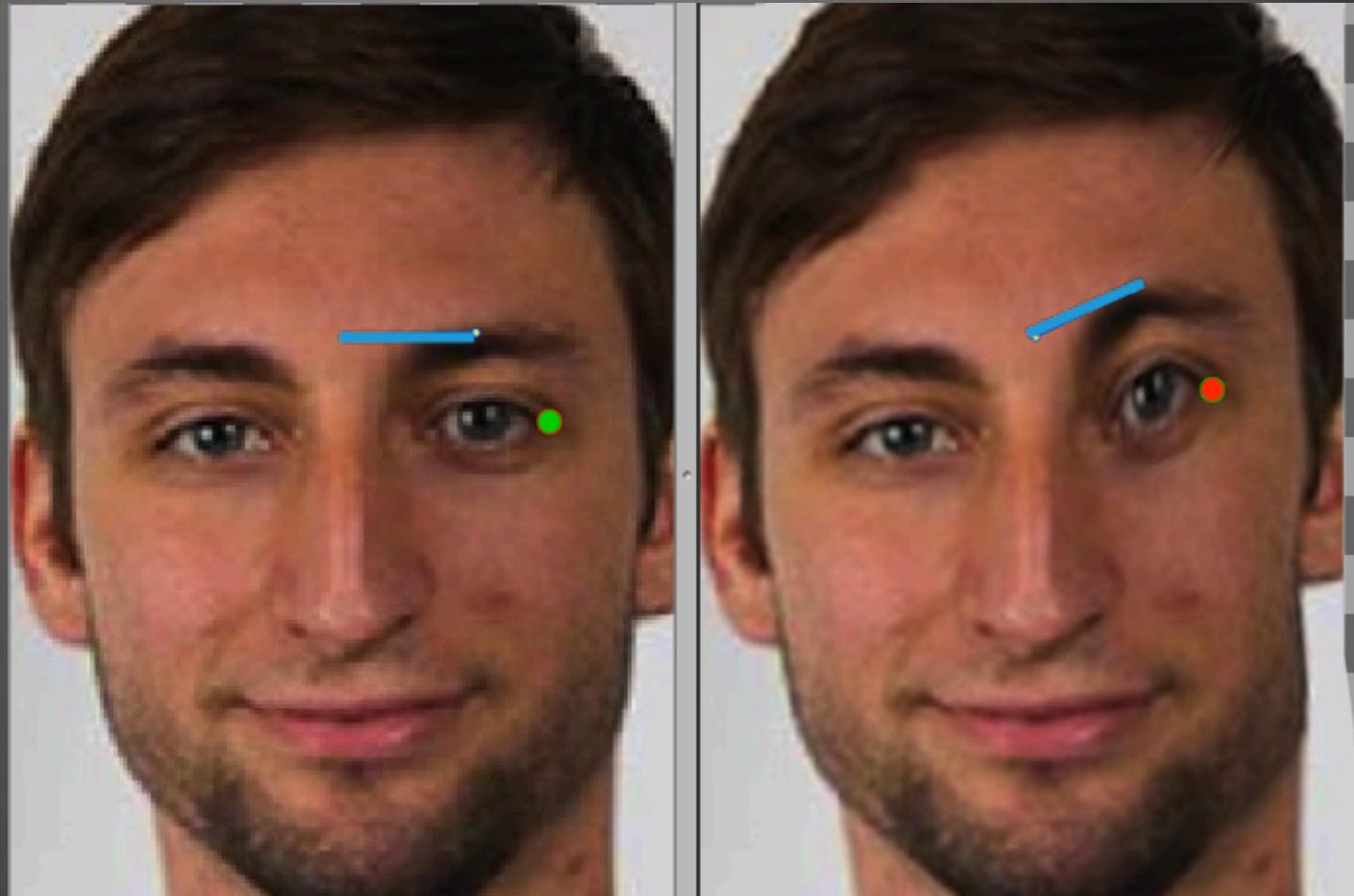
What Factors Effect Each Pixel?

What Factors Effect Each Pixel?

Pretend That...
    Image = Rubber
    Line = Metal Rod

What Factors Effect Each Pixel?

Pretend That...
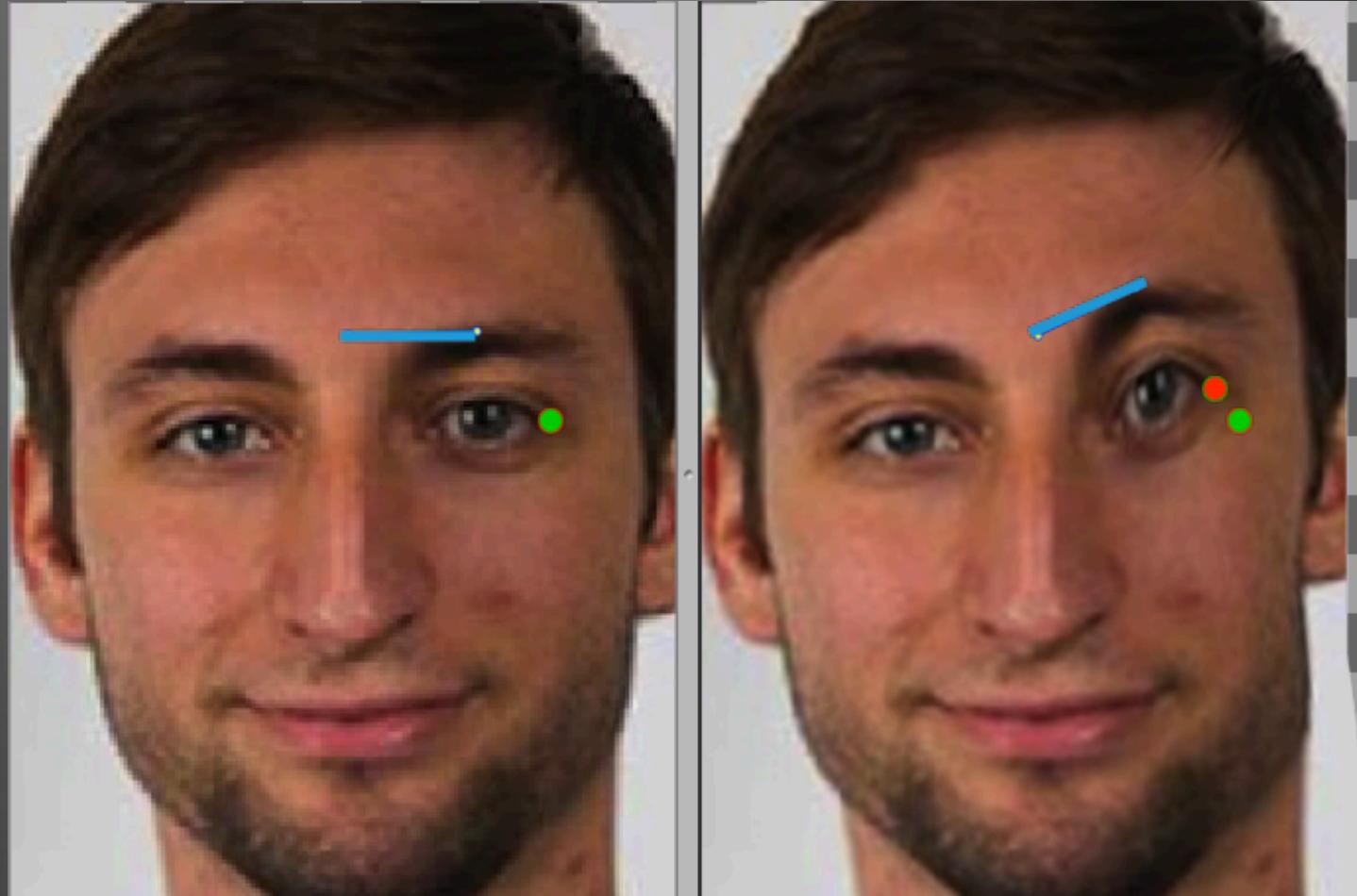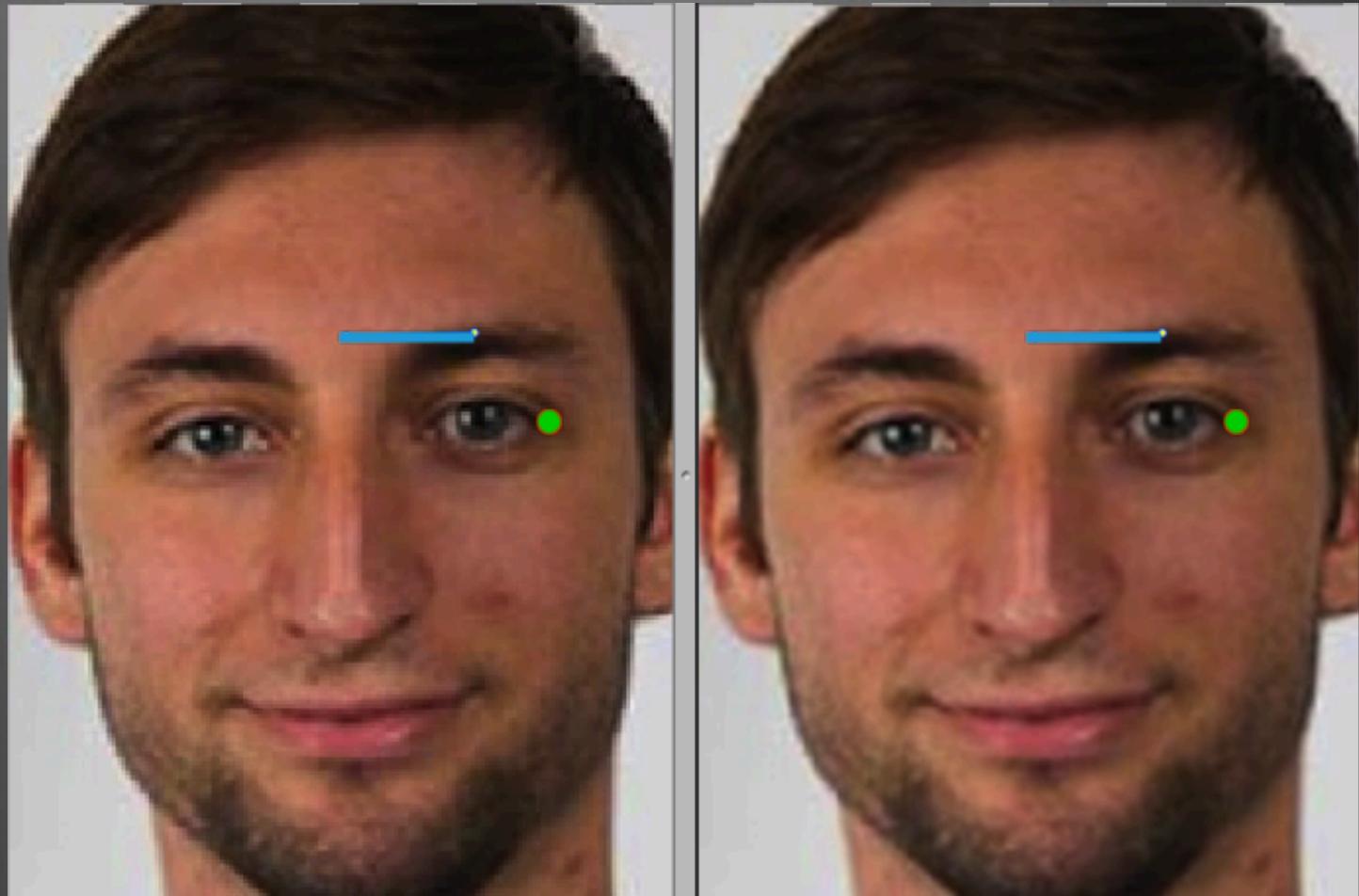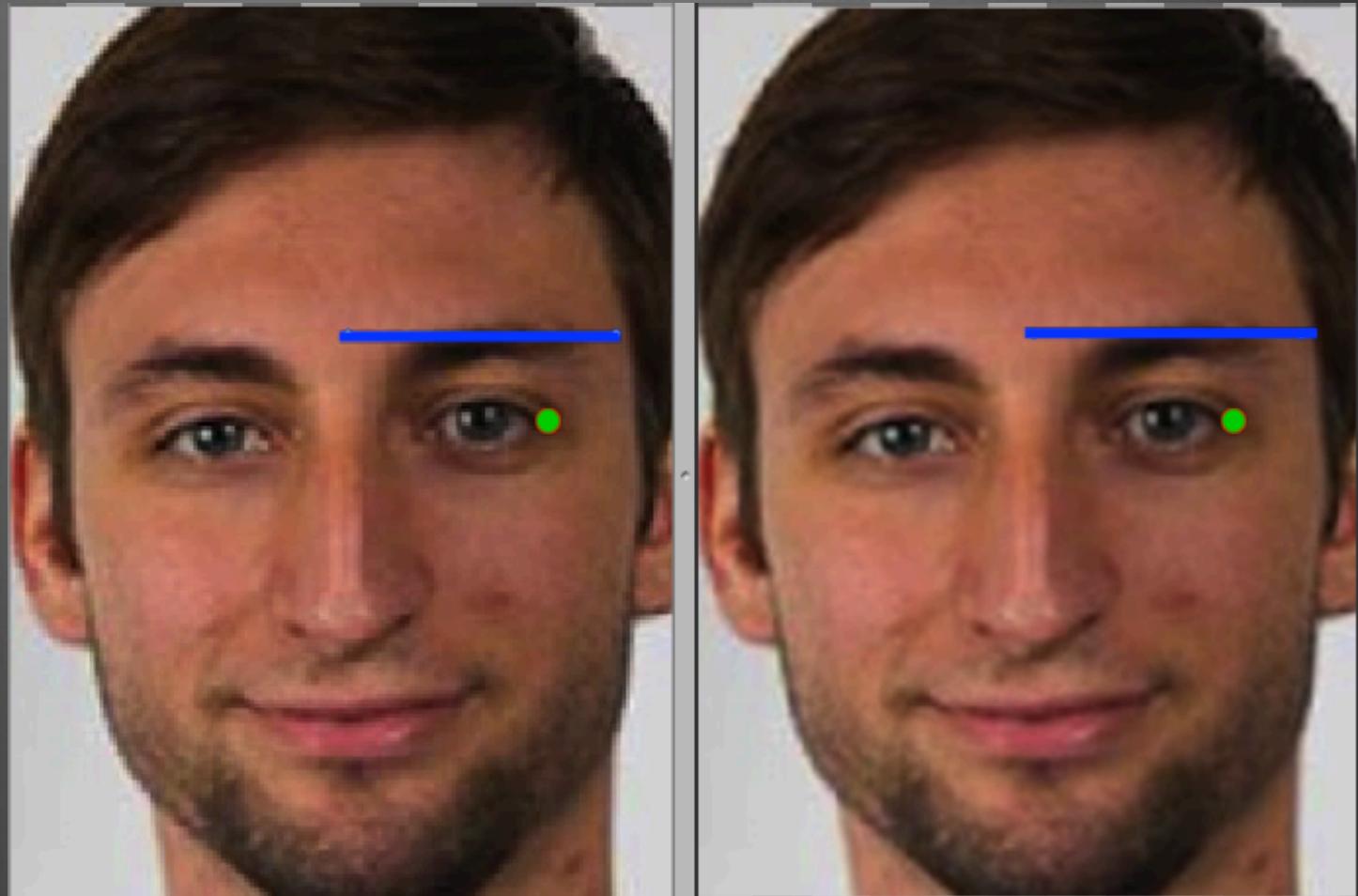 Image = Rubber
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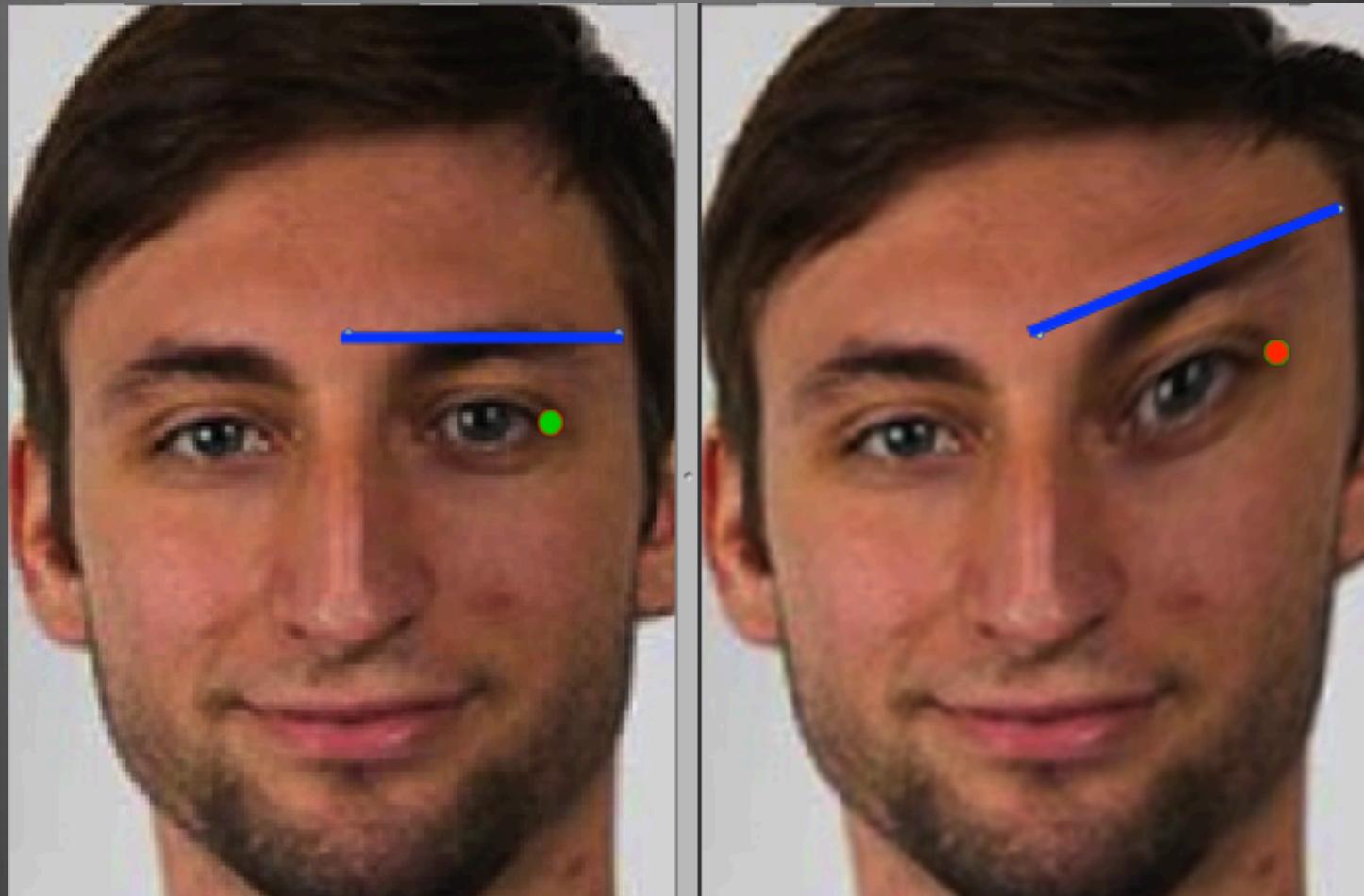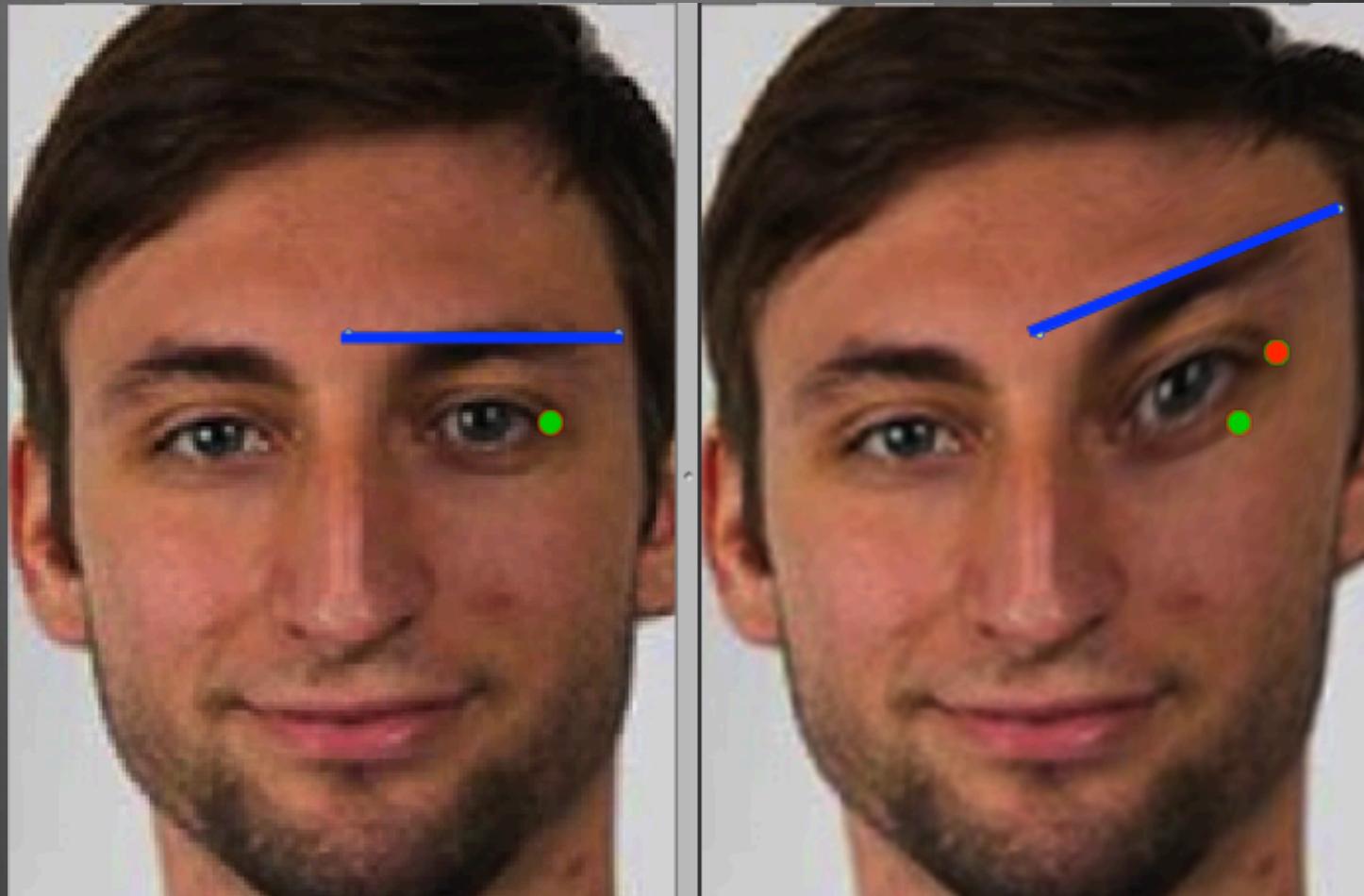
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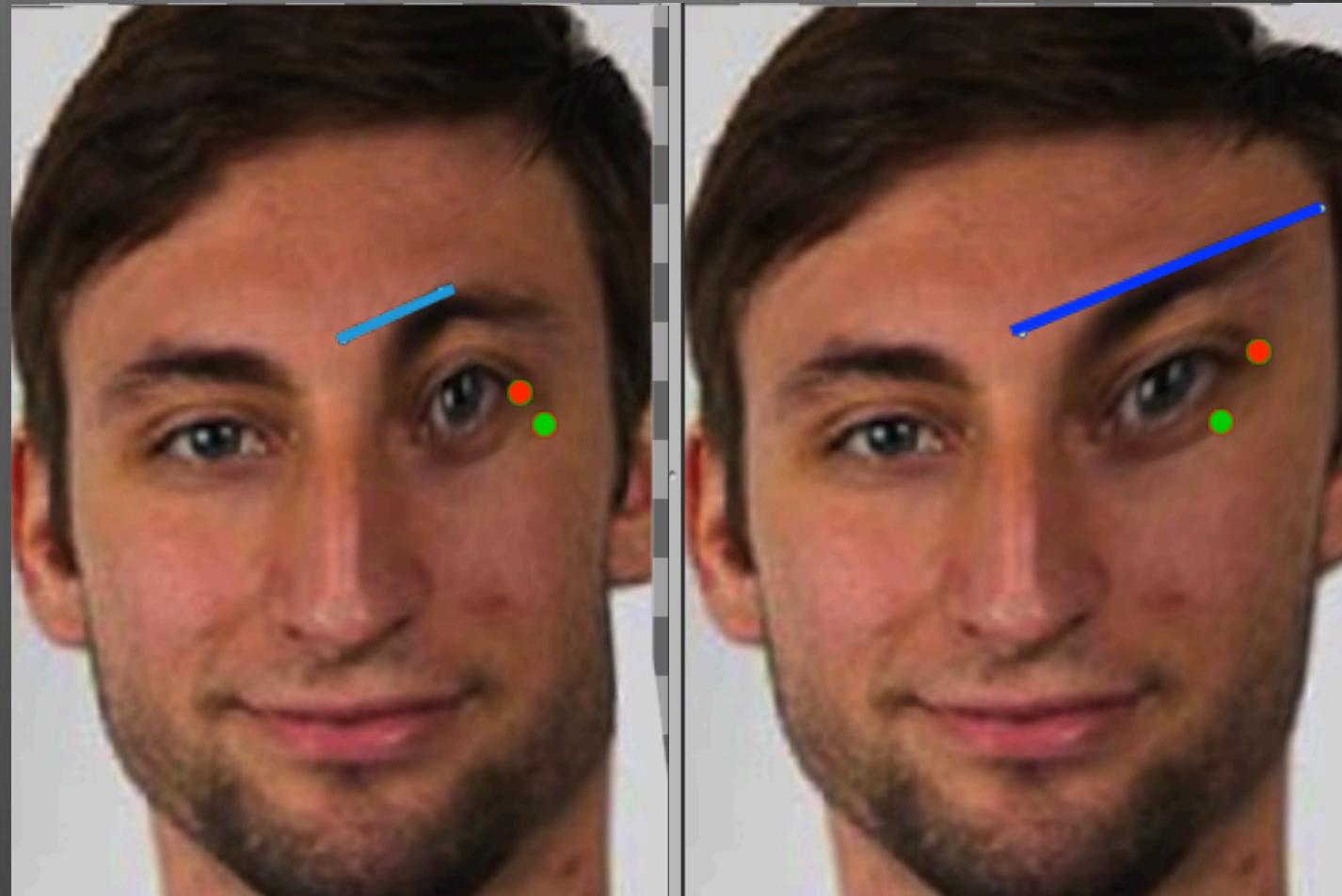Image = Rubber
Line = Metal Rod

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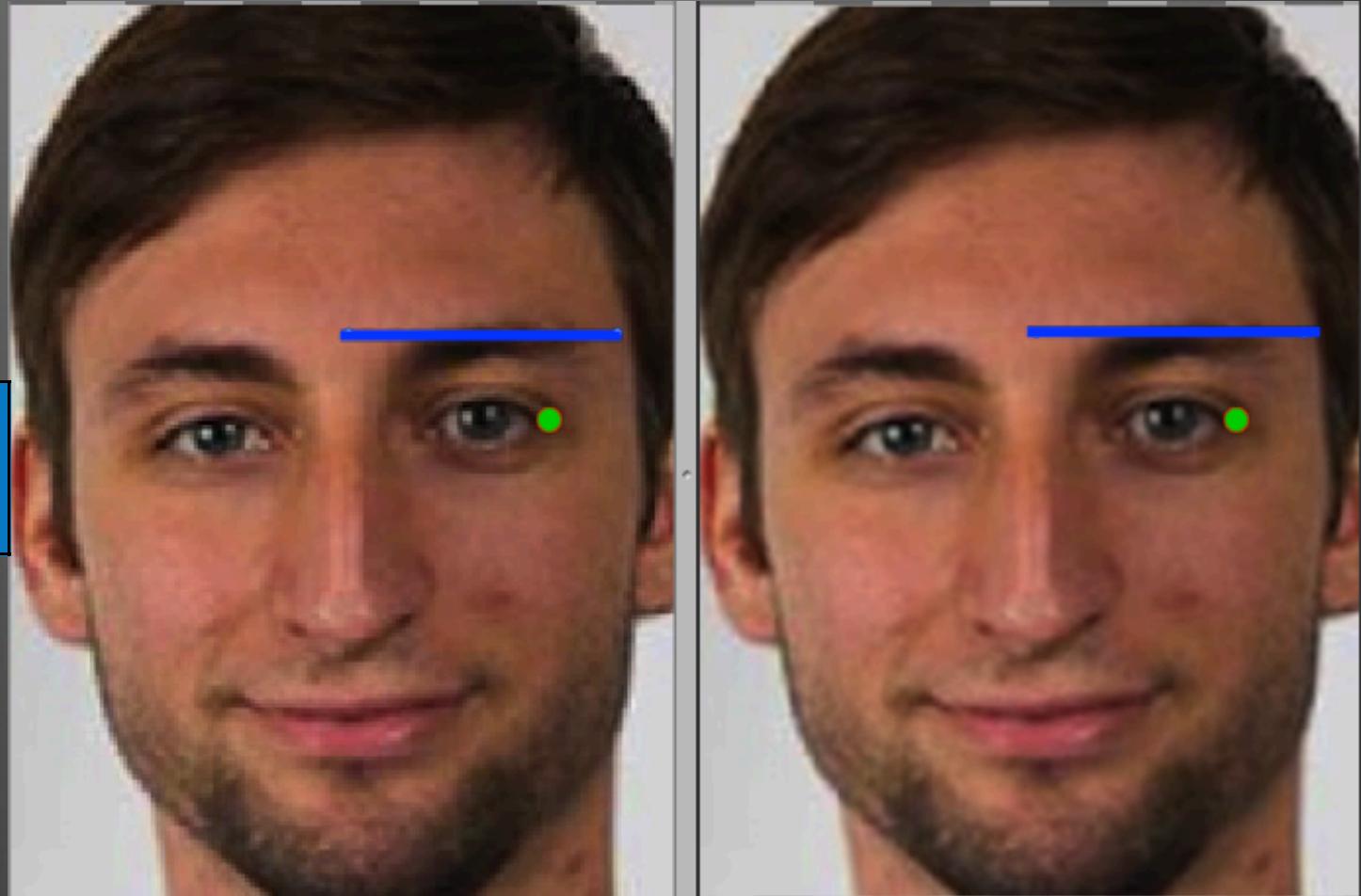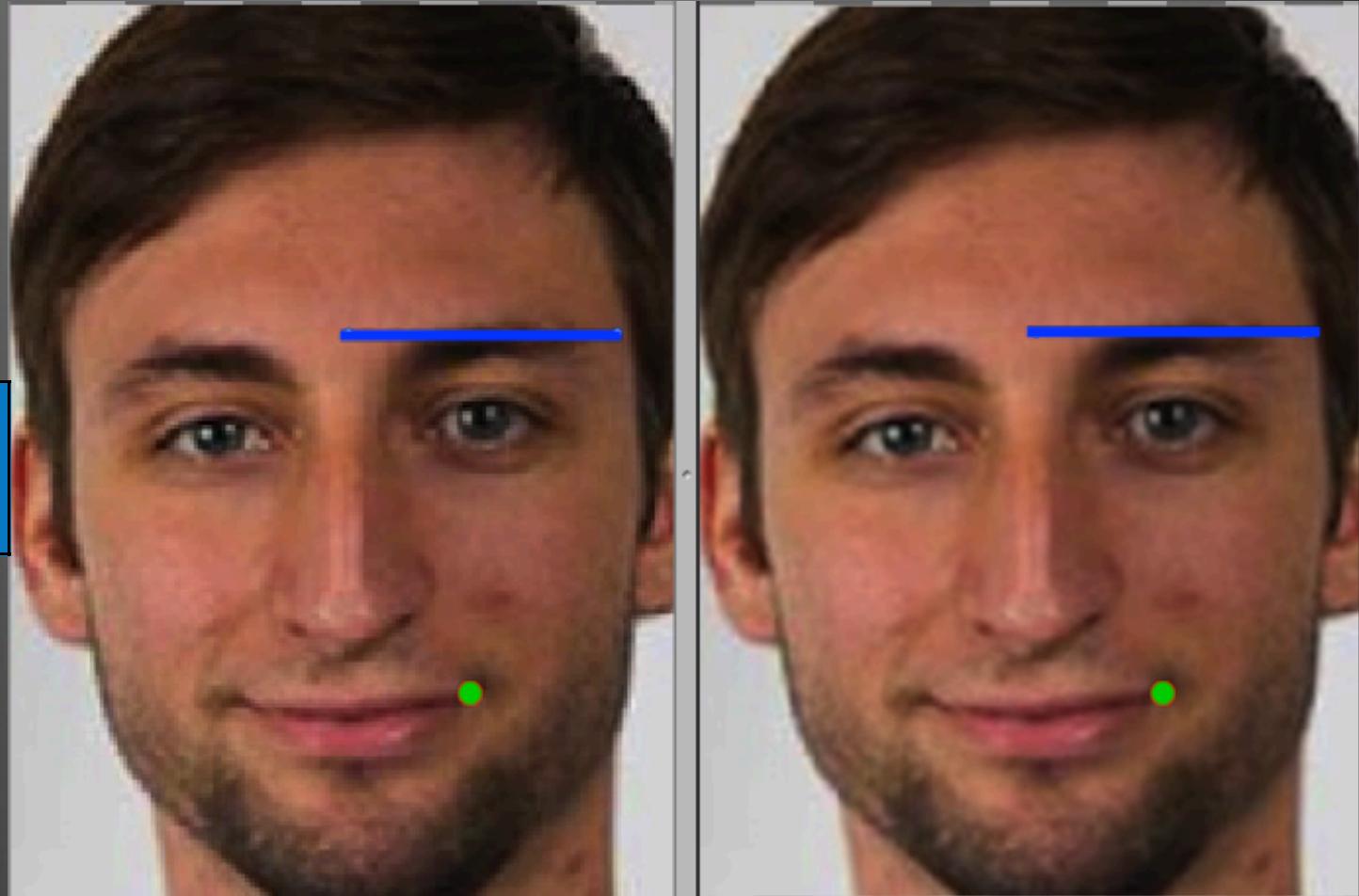Line = Metal Rod

line effect
on pixel $\propto$ *length*

What Factors Effect Each Pixel?

Pretend That...
Image = Rubber
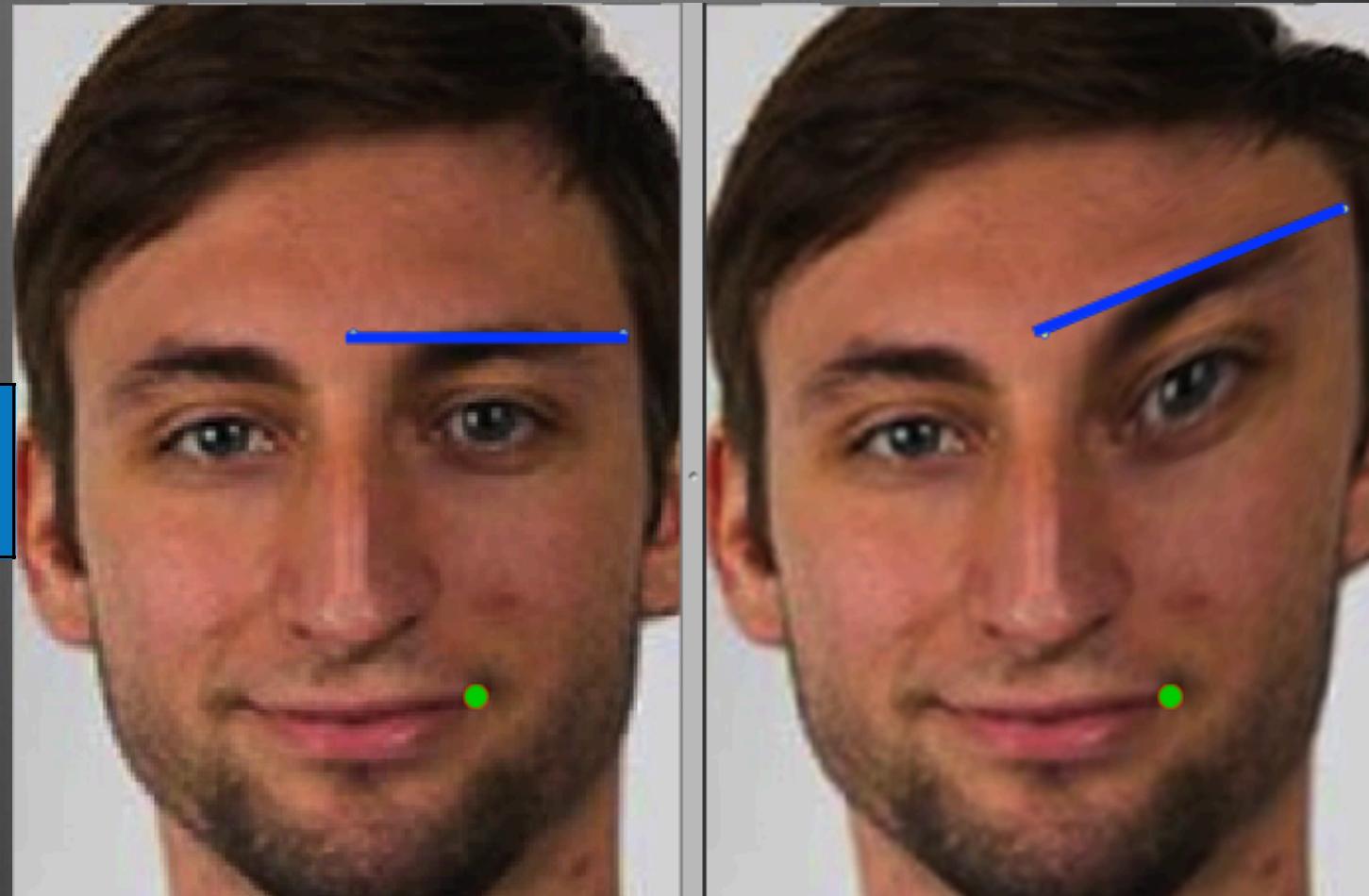Line = Metal Rod

line effect on pixel $\propto$ *length*

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   Image = Rubber
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Pretend That...
    Image = Rubber
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What Factors Effect Each Pixel?
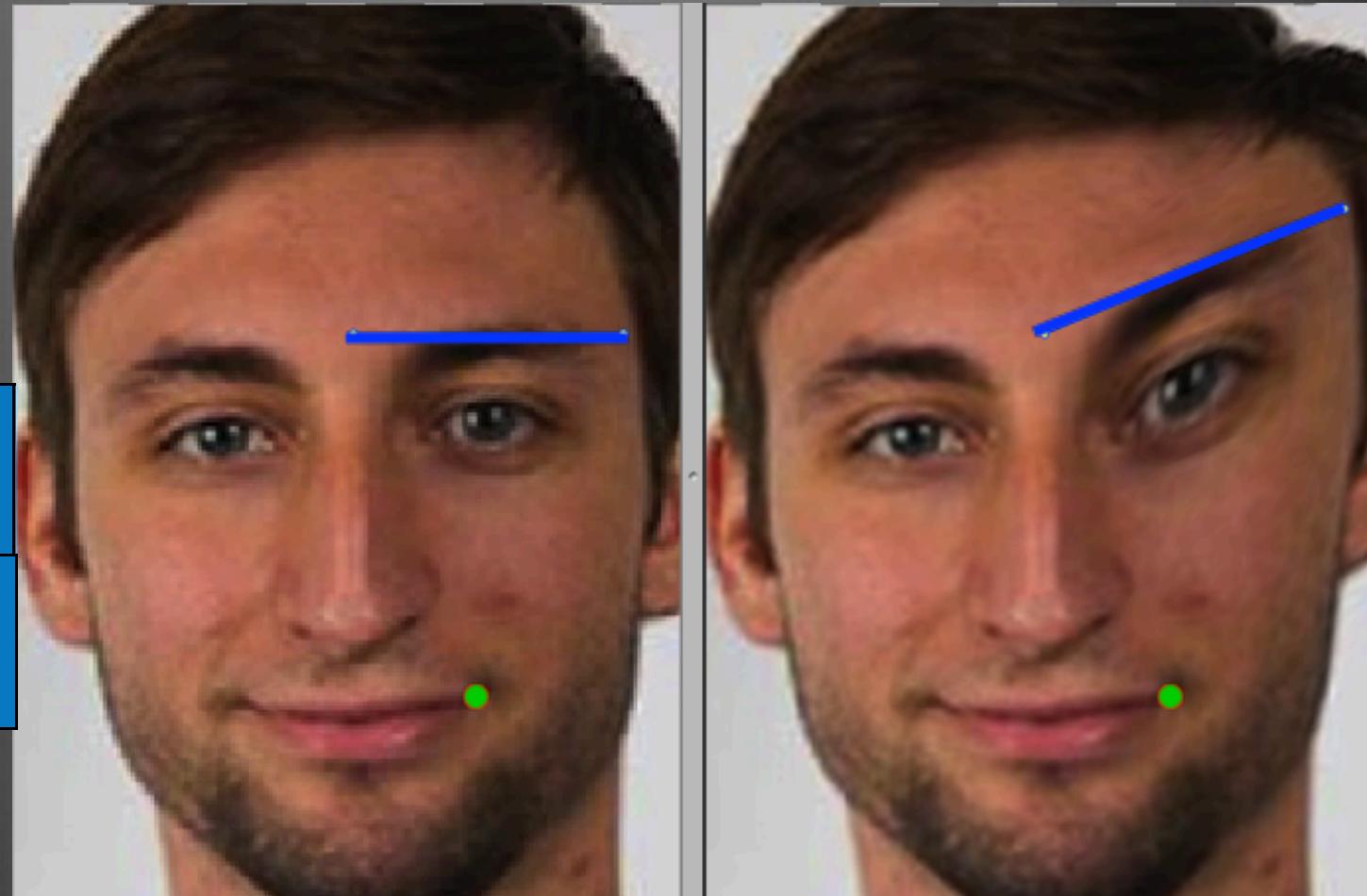
Pretend That...
 Image = Rubber
 Line = Metal Rod

line effect on pixel $\propto length$

$\propto \dfrac{1}{dist}$

What Factors Effect Each Pixel?

Pretend That...
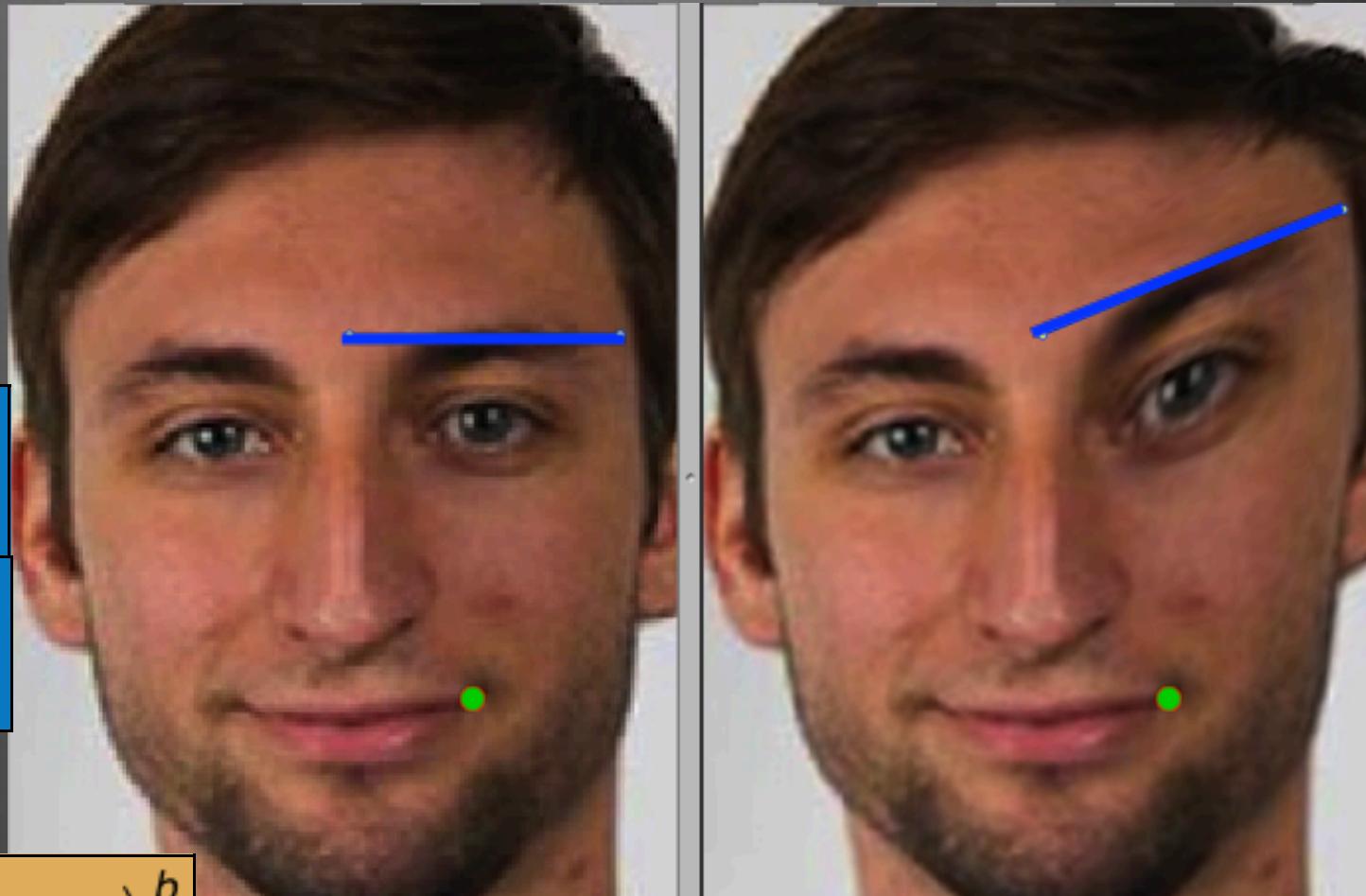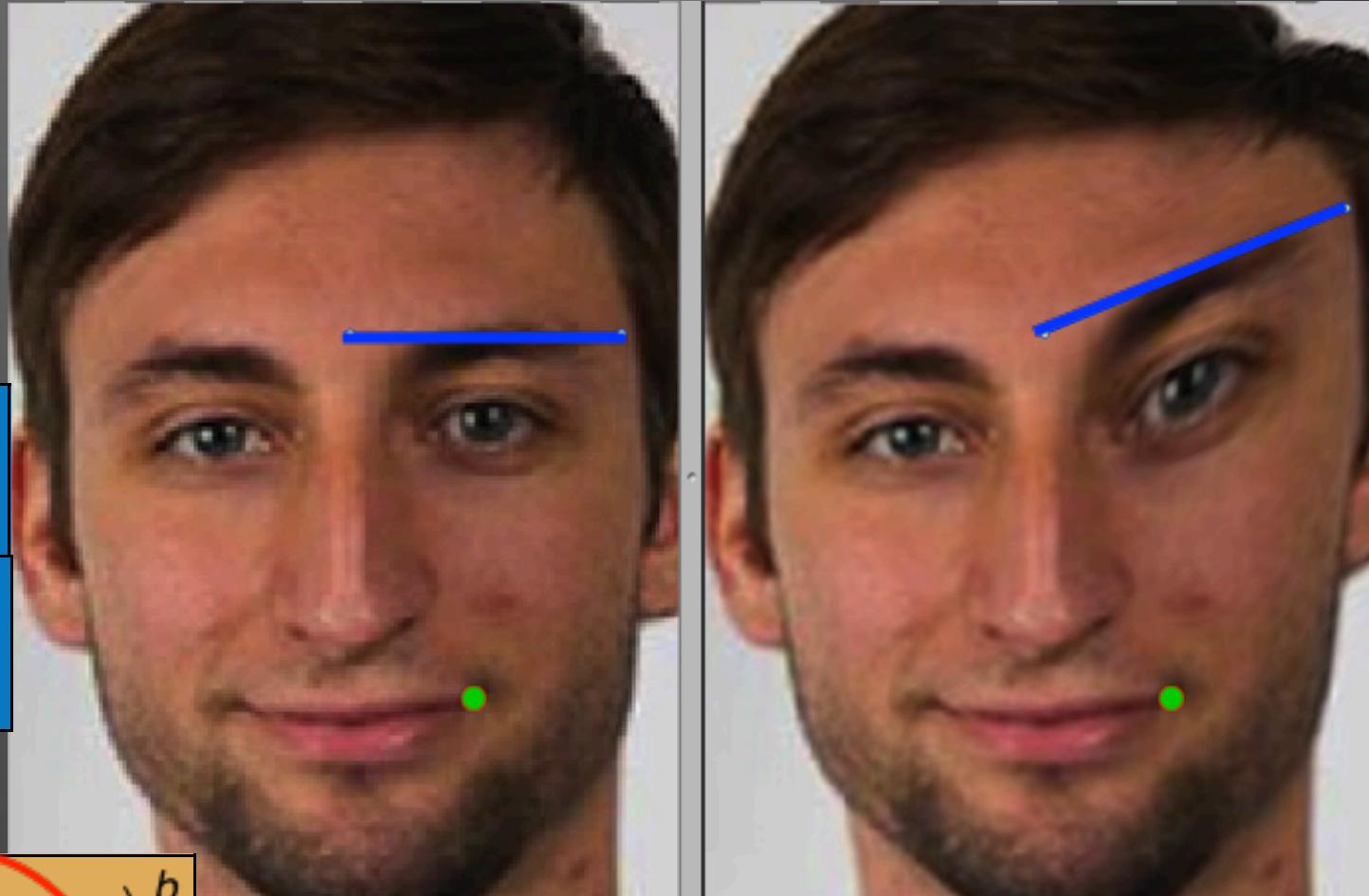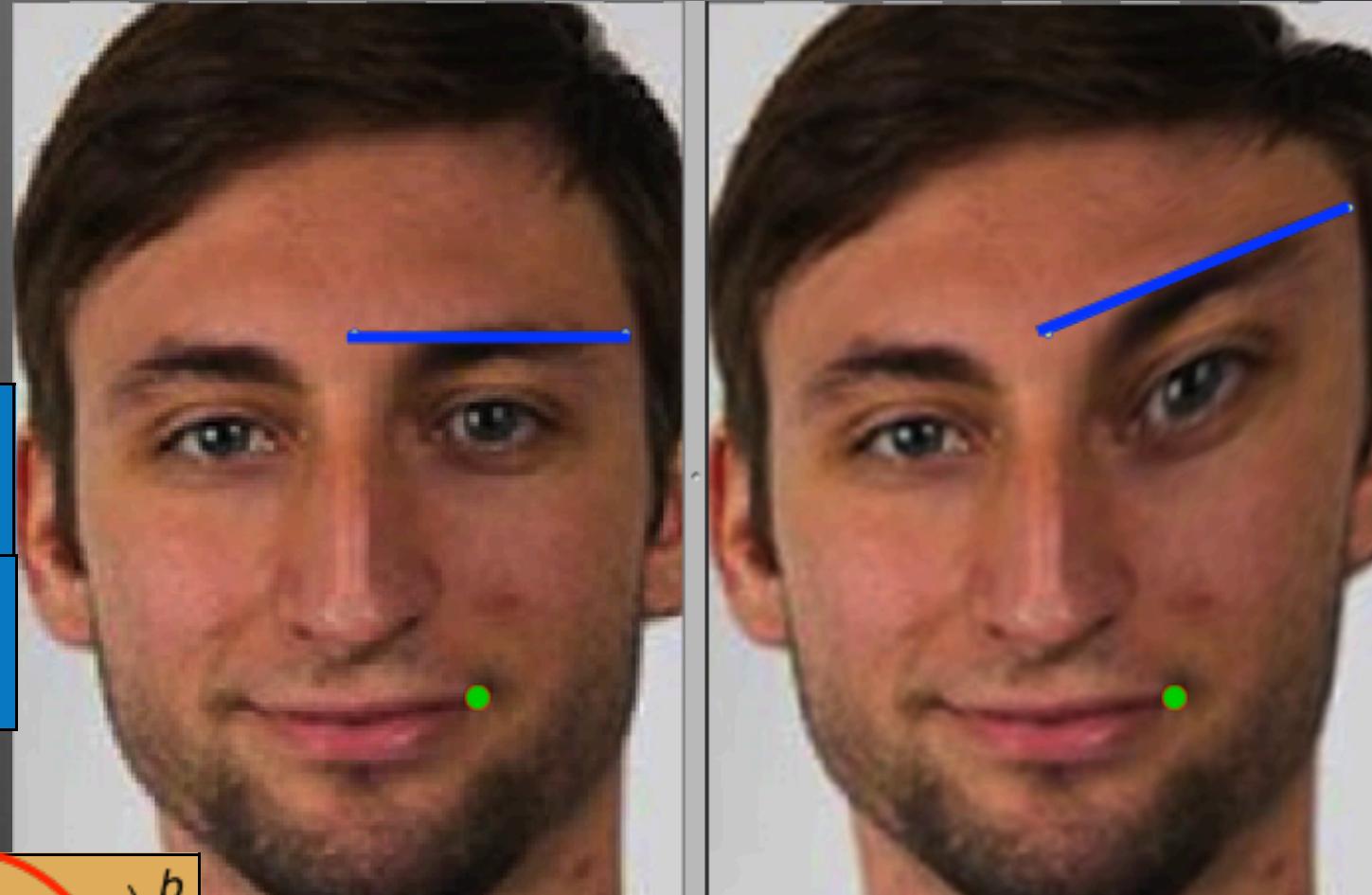Image = Rubber
Line = Metal Rod

line effect on pixel $\propto length$

$\propto \dfrac{1}{dist}$

$weight = \left(\dfrac{length^p}{a + dist} \right)^b$

What Factors Effect Each Pixel?

Pretend That...
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line effect on pixel $\propto length$

$\propto \dfrac{1}{dist}$

$weight = \left(\dfrac{length^p}{a+dist}\right)^b$

What Factors Effect Each Pixel?

Pretend That...
Image = Rubber
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line effect on pixel $\propto length$

$$\propto \frac{1}{dist}$$

$$weight = \left(\frac{length^p}{a + dist} \right)^b$$

a, b, p add customization

Morphing =   ?
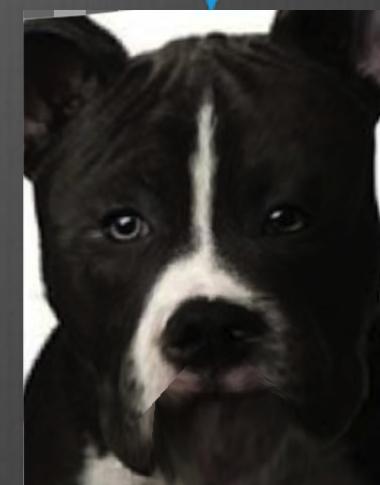
Morphing = Cross-Dissolve   ?
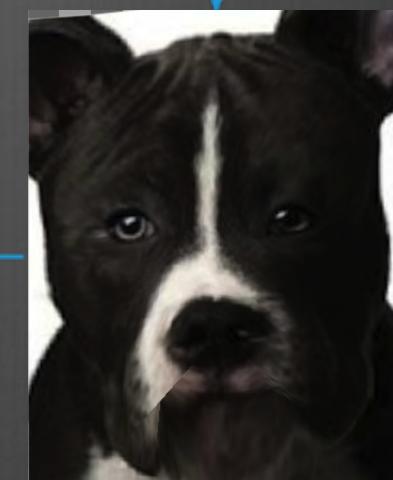
Morphing = Cross-Dissolve   ?
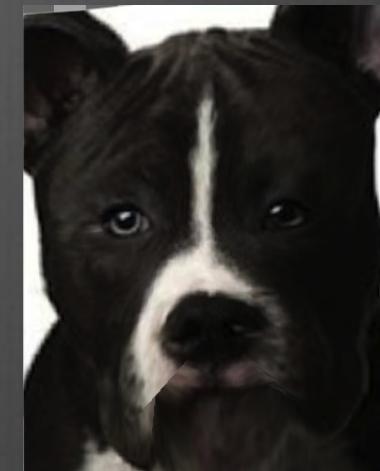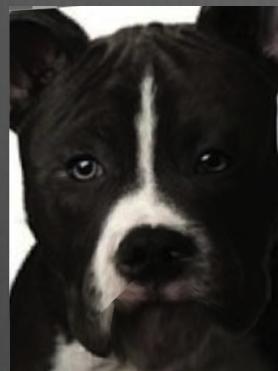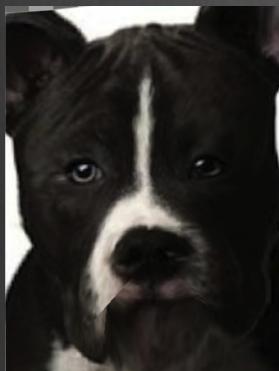

We can do better!

Morphing = Warping + ?

Morphing = Warping + Cross-Dissolve ✔

Morphing = Warping + Cross-Dissolve ✔

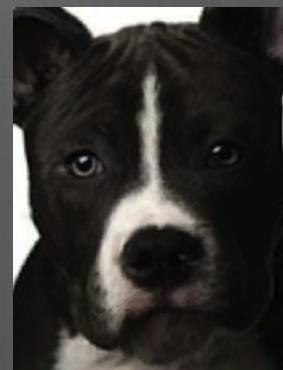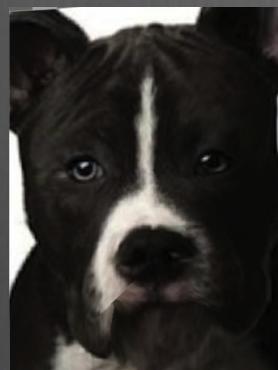# Morphing = Warping + Cross-Dissolve ✔

Morphing = Warping + Cross-Dissolve ✔
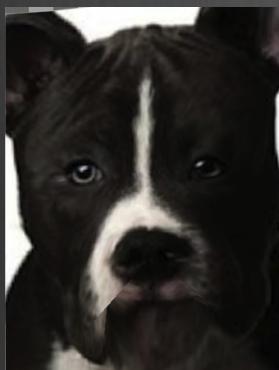
Morphing = Warping + Cross-Dissolve ✔

Morphing = Warping + Cross-Dissolve ✔
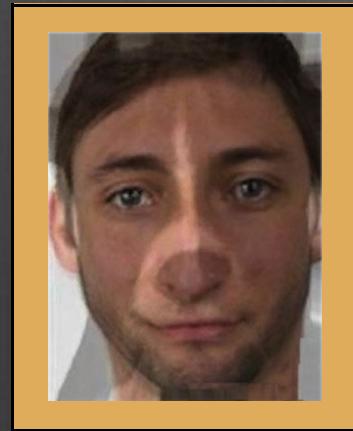
Morphing = Warping + Cross-Dissolve ✔

Morphing = Warping + Cross-Dissolve ✔

Morphing = Warping + Cross-Dissolve ✔

Morphing = Warping + Cross-Dissolve ✔