

“Who are you going to believe, me or your lying  
eyes?”  
– Groucho Marx

# Observation and Perception

Supplementary Material for CFB3333/PHY3333  
Professors John Cotton and Stephen Sekula  
February 1, 2012

Based on the following information on the web:

<http://www.physics.smu.edu/pseudo/Observ>

## Eyewitness Exercise

<http://www.physics.smu.edu/devel/pseudo/Observ/description.html>

# Advanced 3-D CGI HDR Rendering of Suspect



# Eyewitness Testimony

- In the pantheon of scientific evidence, how does eyewitness testimony rank?
  - in the legal system, it is considered a useful form of evidence and plays a central role in trials
- Eyewitness testimony is compelling, emotional evidence in the courtroom, but scientifically it is the **WEAKEST** form of evidence.
  - Witnesses can be completely sincere, completely sure of what they saw, and completely **WRONG!**
  - Witnesses can also lie, but even when sincere they may not have seen what they claim to have seen.

# Observation and Perception

# The Scientific Method

## A Brief Review

- Observation of a phenomenon
  - what kind of observations?
  - how reliable are the observations?
- Formulation of an hypothesis
  - [how does one begin to form a causal explanation for the phenomenon?](#)
  - what evidence is used to generate the hypothesis?
  - how reliable is the evidence?
- Performance of experiment
  - what means are available for testing different properties or ideas?
  - how does one setup a reliable experiment?
  - how does one gather information from the experiment?

# The Scientific Method

## A Brief Review

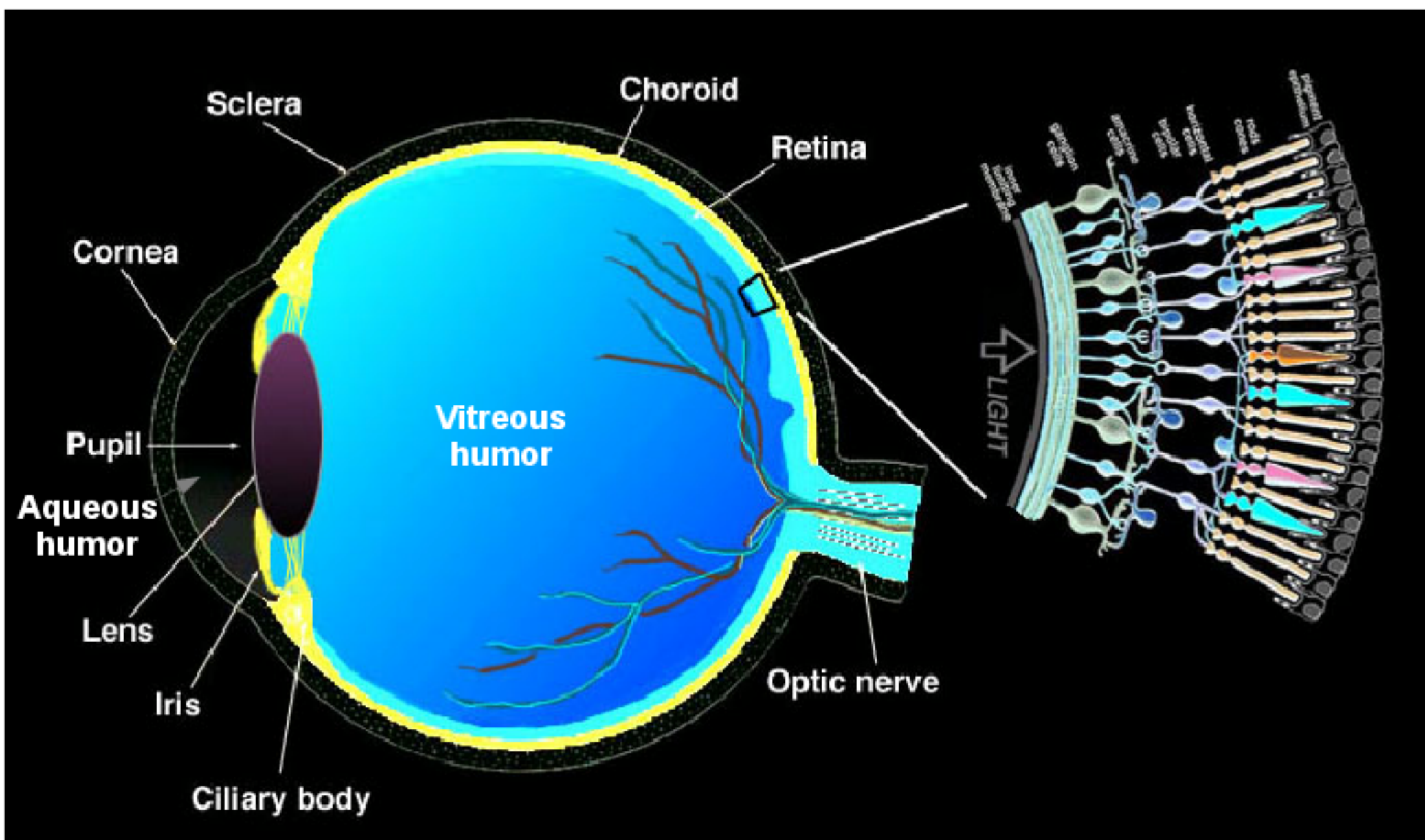
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  - **how does one begin to form a causal explanation for the phenomenon?**
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# Questions to Ask

- Are we “perfect observing machines?”
  - if not, how might our perceptions be flawed or compromised?
- What assumptions enter into our perception?

# The Human Eye



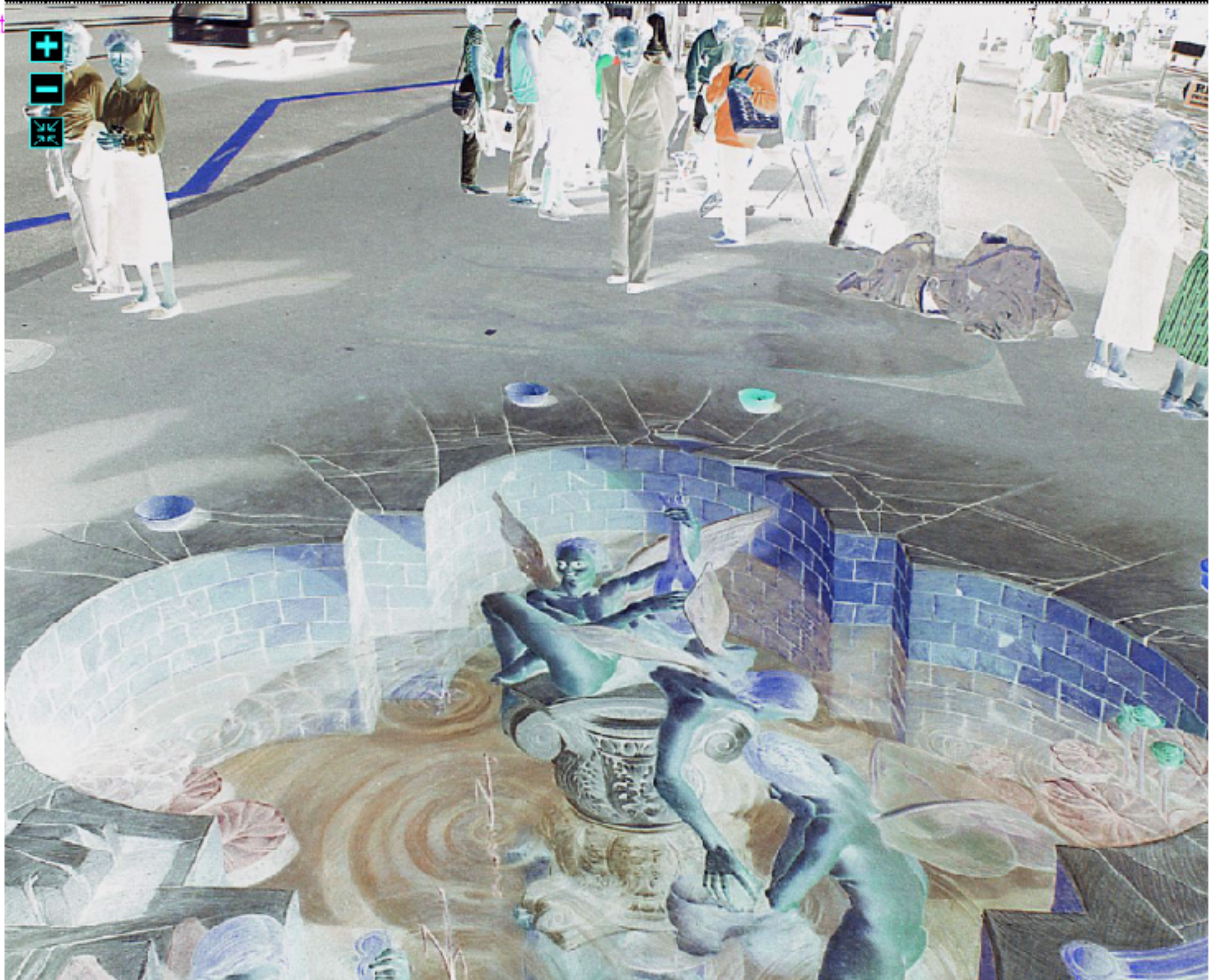
# My Human Eye

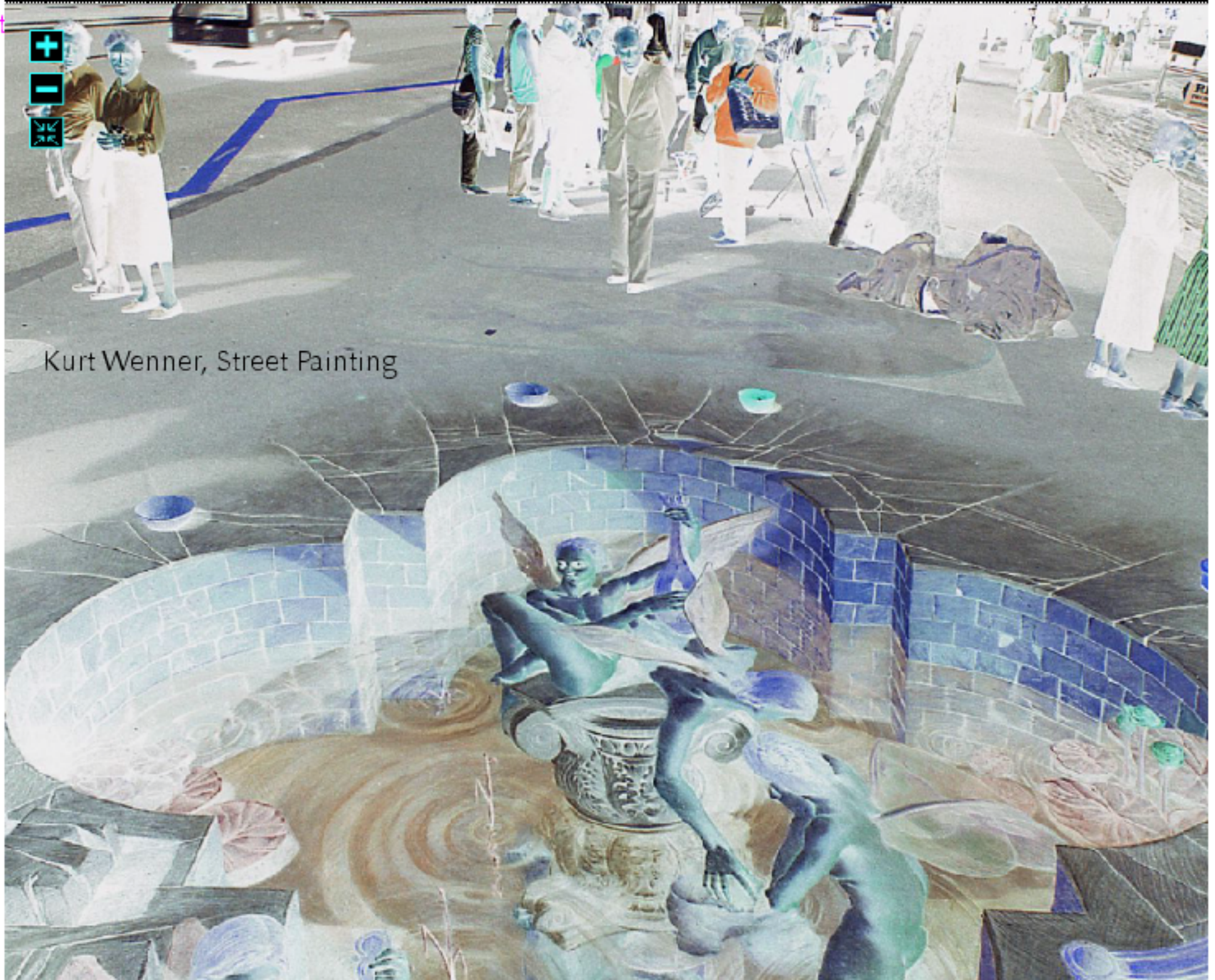


# The Blind Spot Test

# A Movie of Many Optical Illusions

<http://www.youtube.com/watch?v=bOP37A1EhEs>

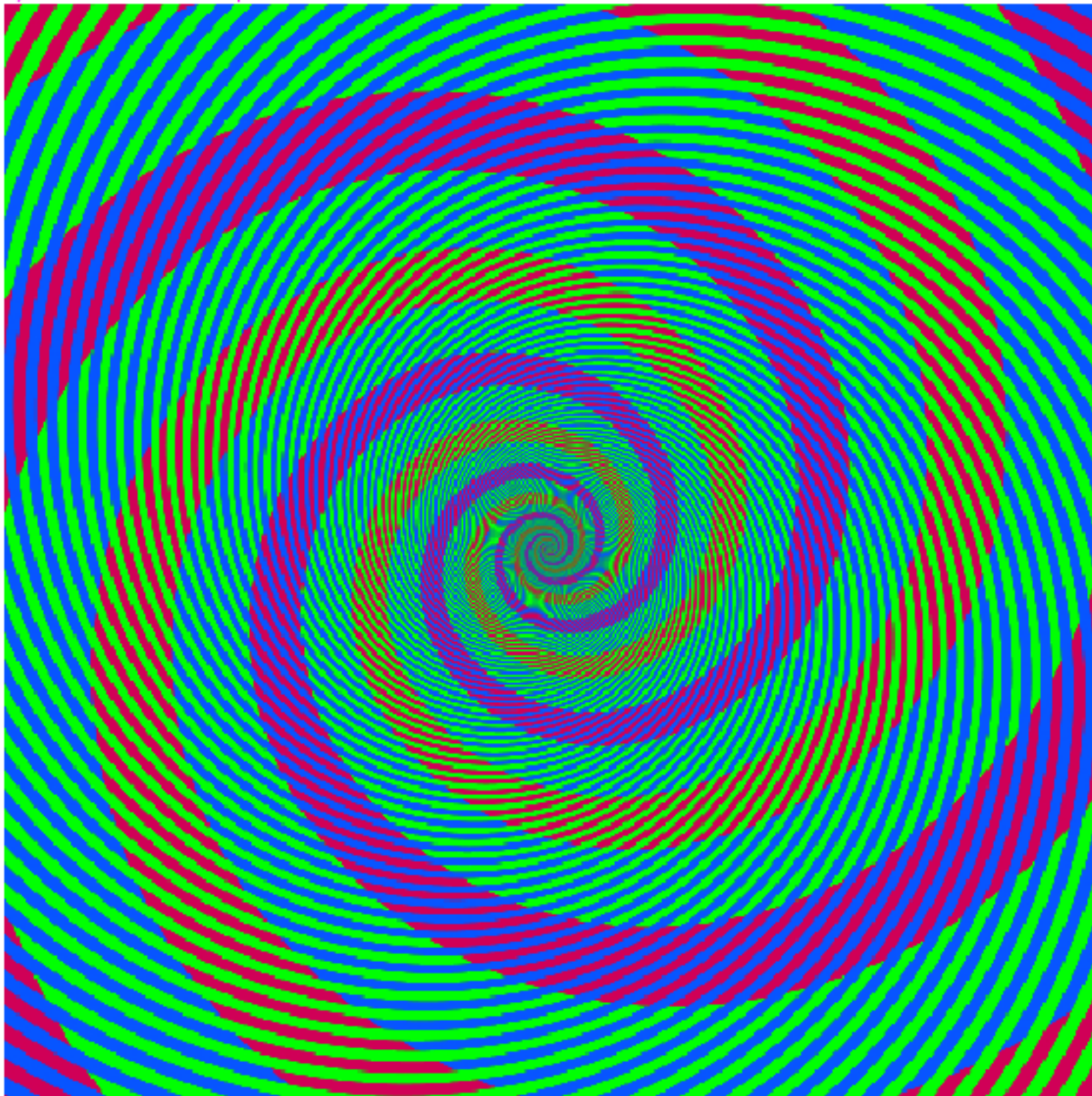


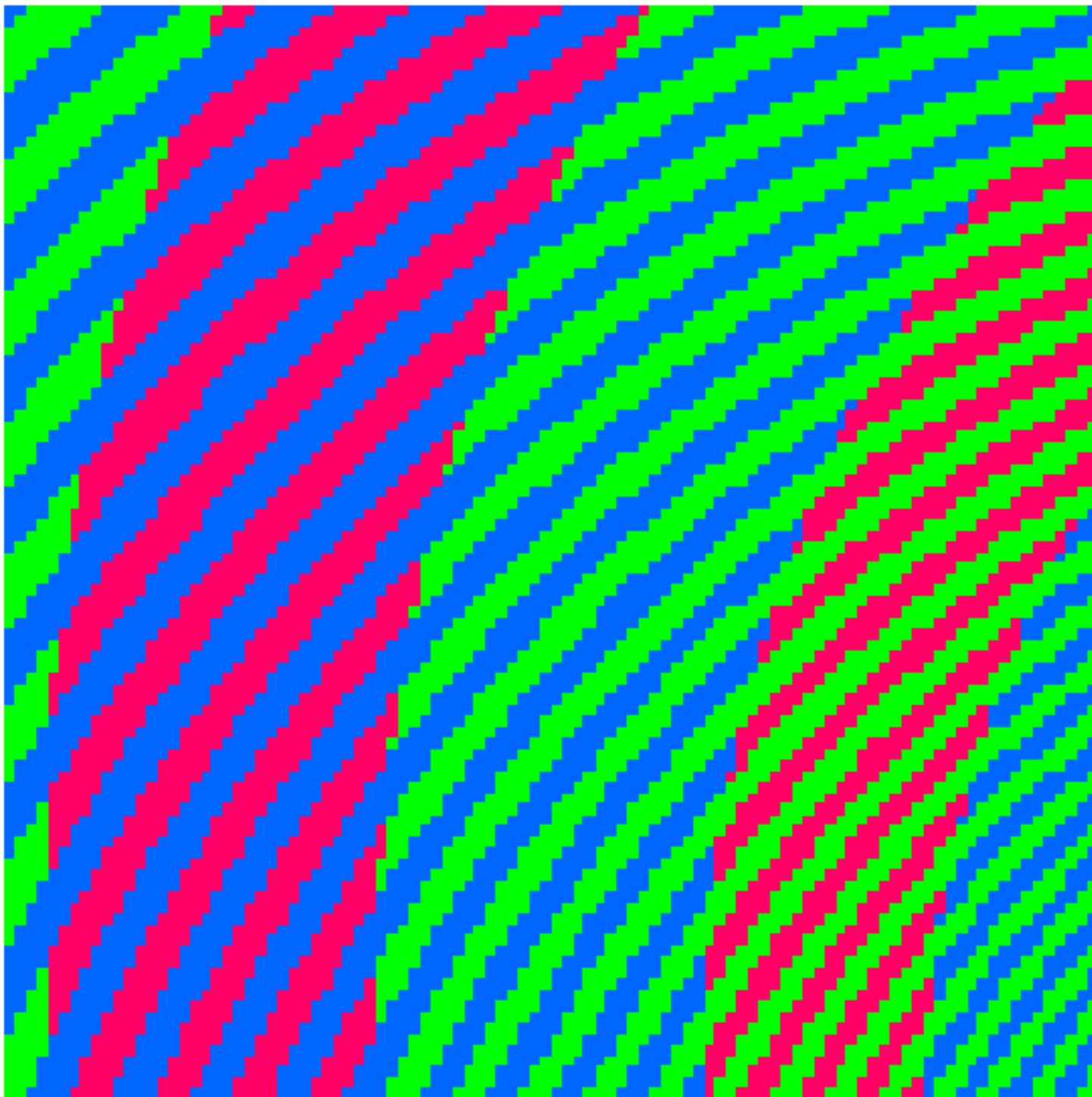


Kurt Wenner, Street Painting









# Questions to Ask

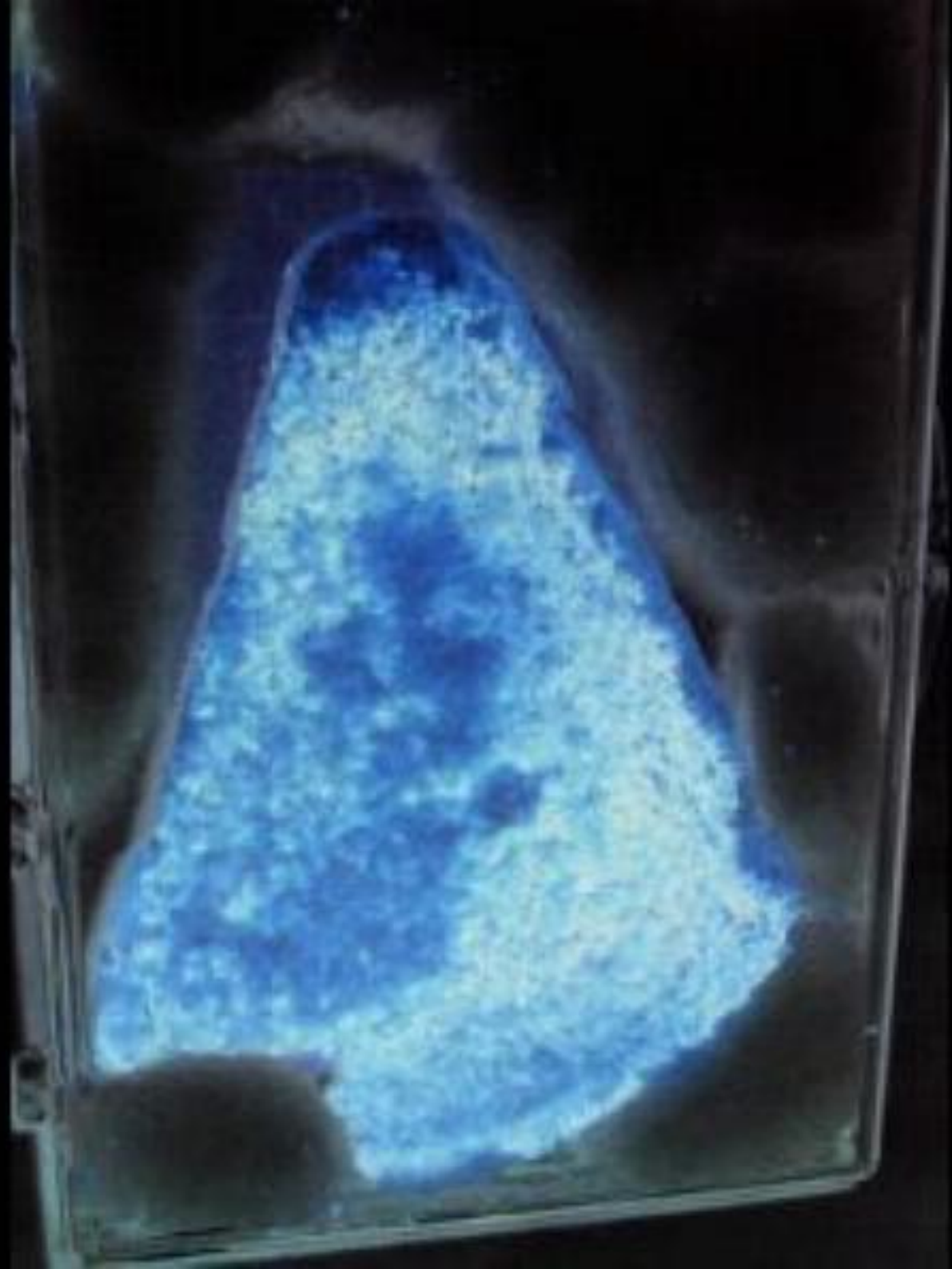
- Are we “perfect observing machines?”
  - if not, how might our perceptions be flawed or compromised?
- What assumptions enter into our perception?
  - our brains handle an onslaught of visual and audio stimuli by first assuming nothing has changed since the last time we looked/listened (assume the status quo)
  - paradigms, existing hypotheses or theories, etc.

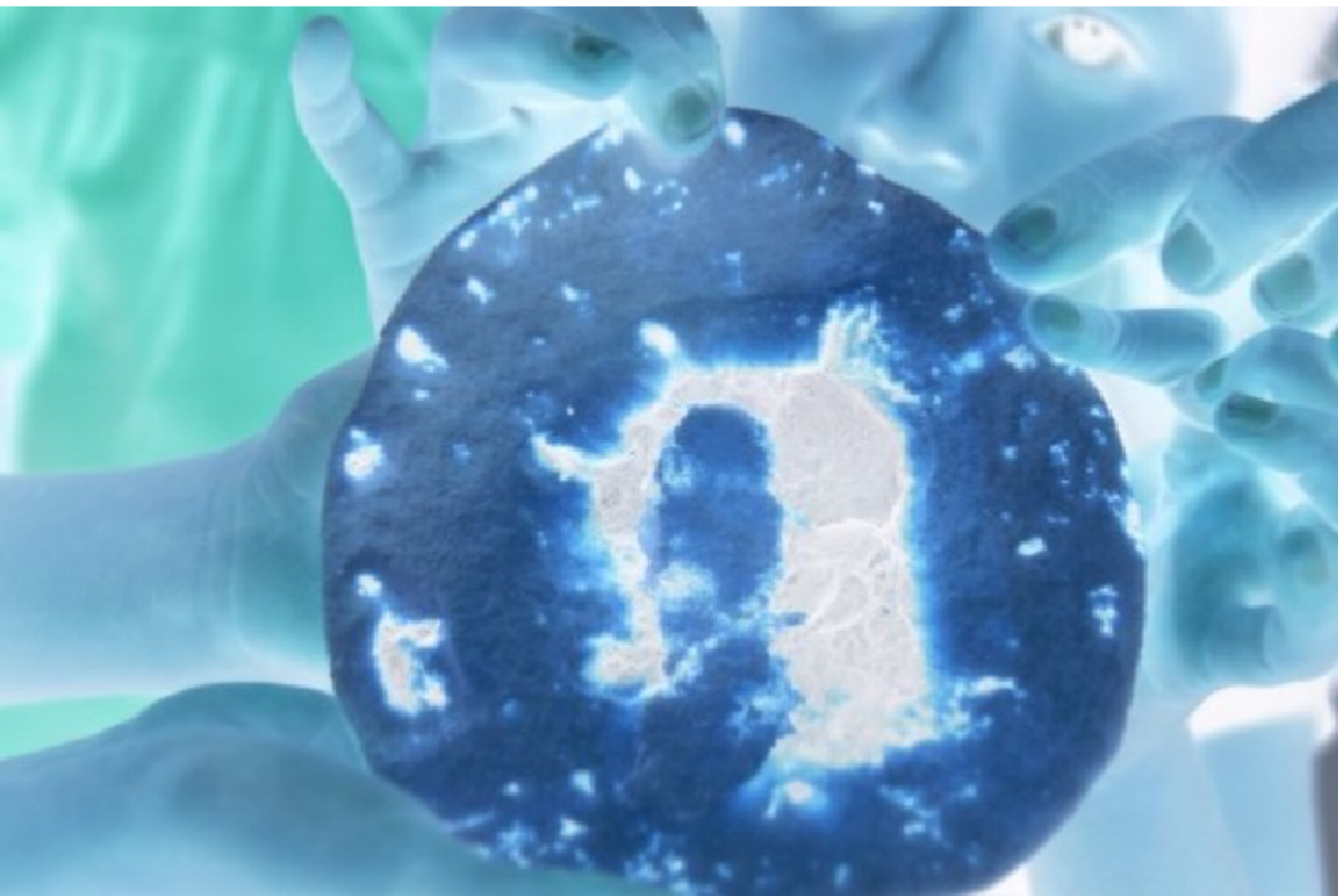
# Paradigm

- A "paradigm" is a world view or perspective formed from known theories.
  - For instance, once these were accepted as fact:
    - The sun and everything else went around the earth
    - Crop failures or other strange phenomena were caused by witchcraft, and it was moral to burn women accused of witchery
    - disease is caused by demons or bad air
    - the continents of the earth are fixed in place and the earth is unchanging
    - all matter is infinitely divisible into every smaller pieces, forming a "continuum" (the atomic theory of matter is only ~100 years old!)

# Pareidolia

- When a vague or obscure stimulus is perceived as clear and distinct





**Bob Seger**  
**and the**  
**Silver Bullet Band**

**NIGHT MOVES**



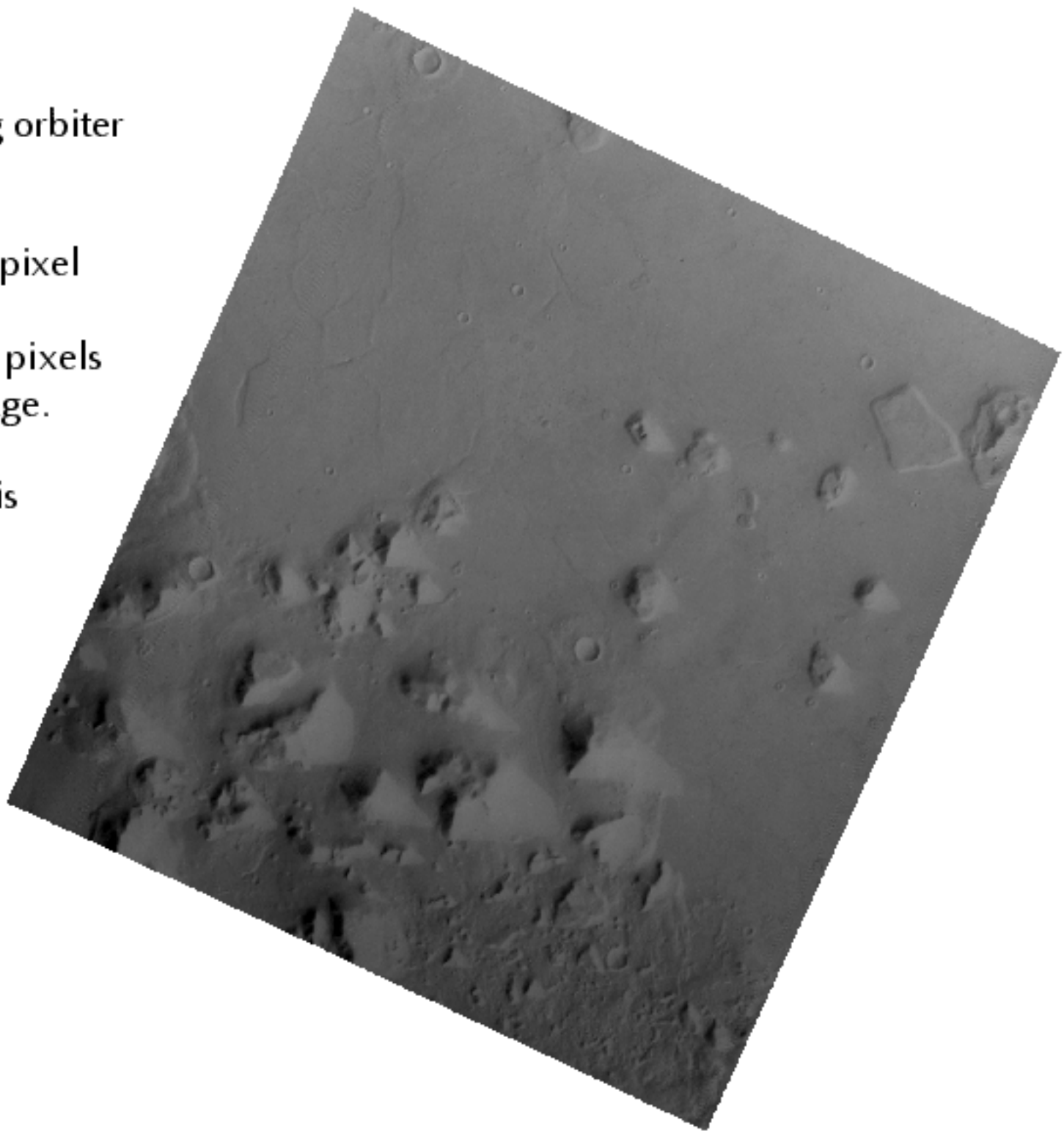


1976 Viking orbiter  
image.

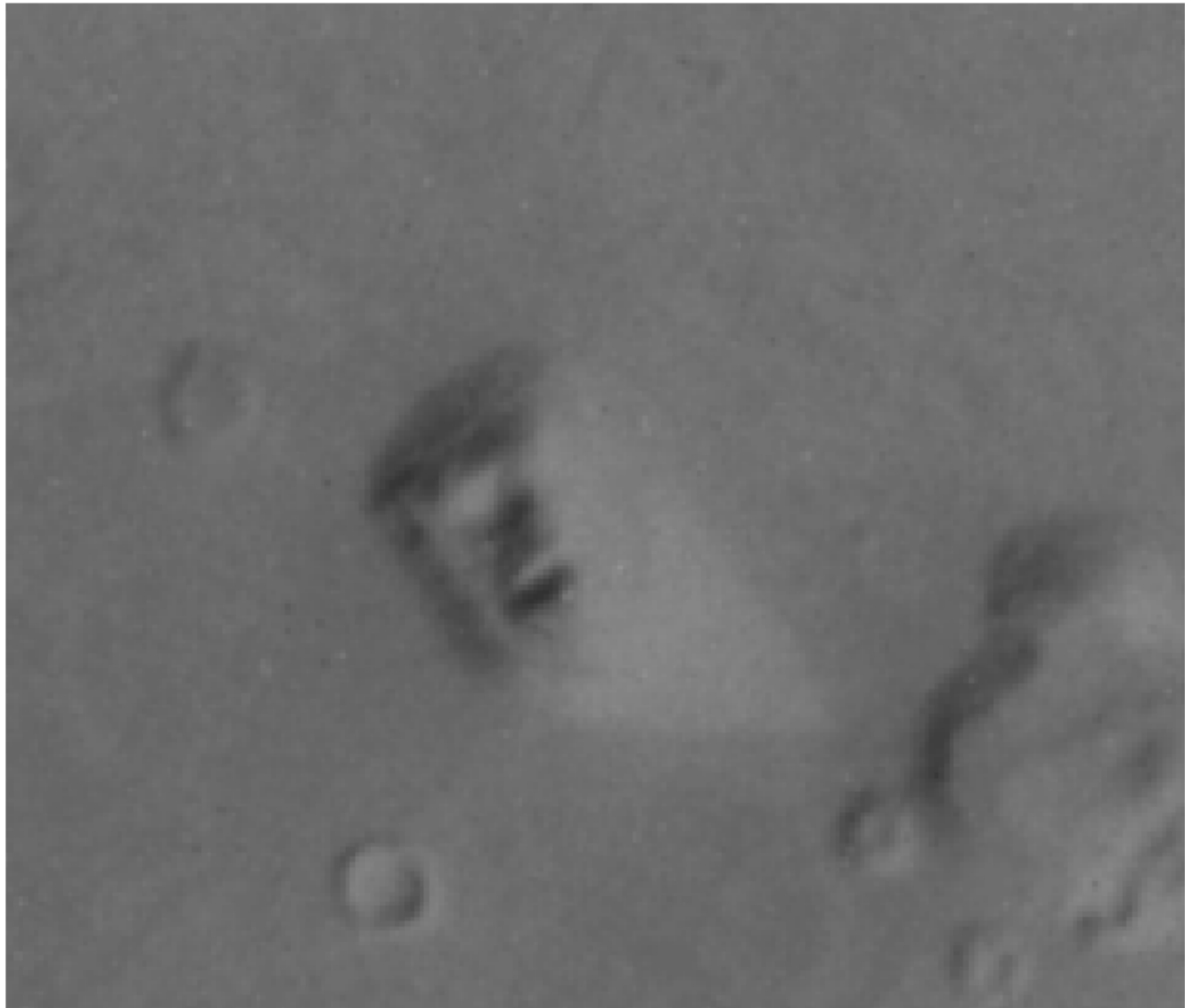
400 meters/pixel

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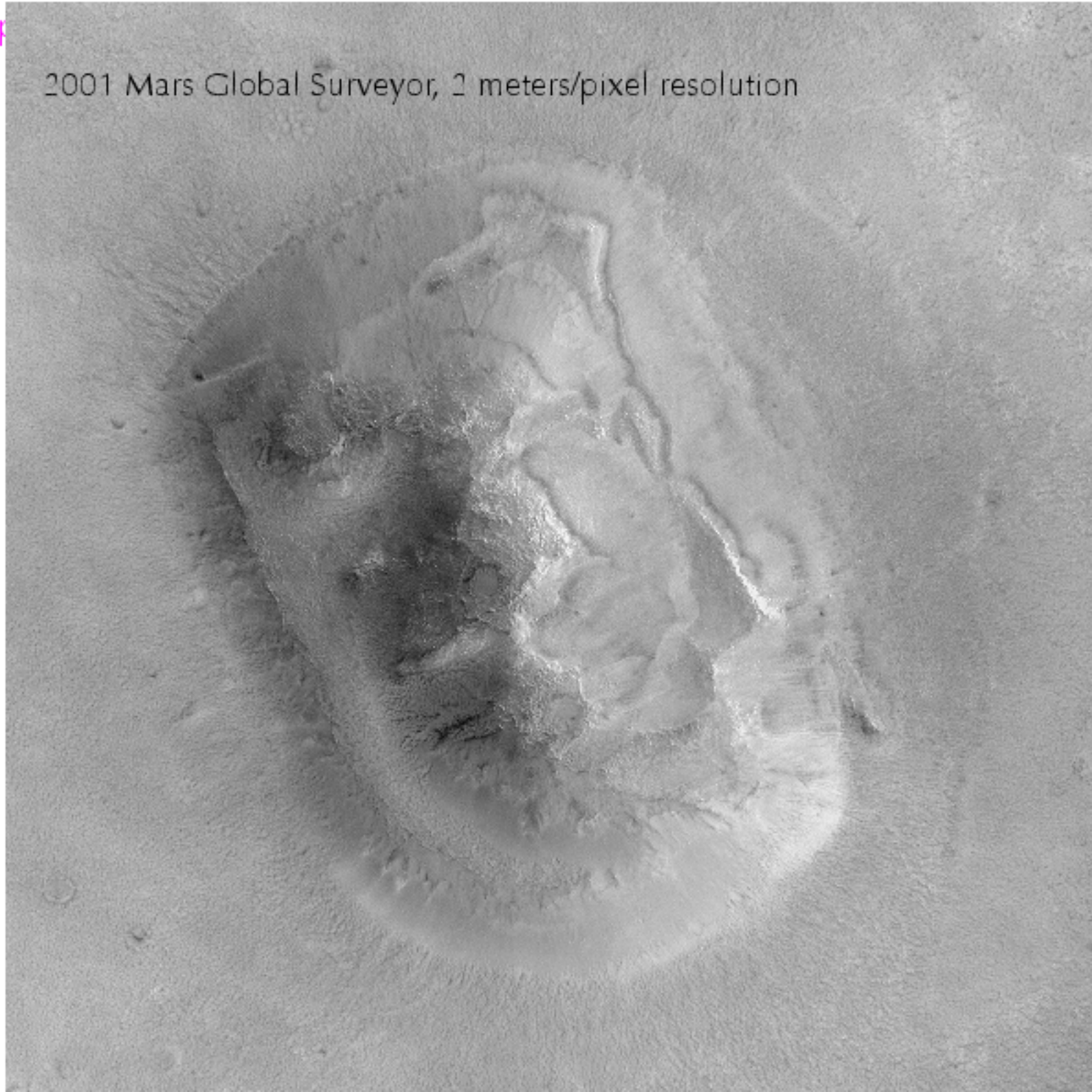
This image is  
made after  
applying  
image  
processing  
techniques.







2001 Mars Global Surveyor, 2 meters/pixel resolution



2006 Mars Express,  
13.7 meters/pixel

