Visual Illusions
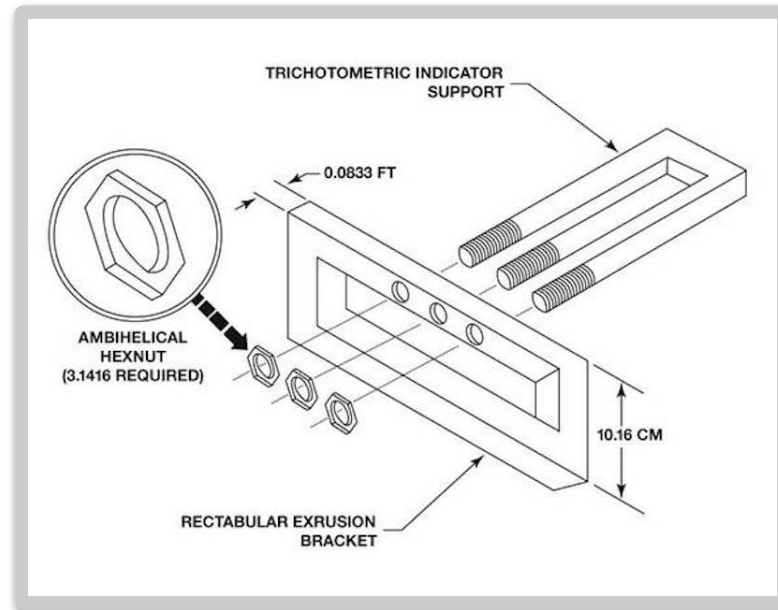
seeing how the mind sees

George Matthews, Plymouth State University

2020

Theories of knowledge

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rationalism

- Mind deduces the basic nature of things from fundamental concepts; knowledge results from thinking things through carefully.

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constructivism

- Mind organizes raw data into a coherent picture of reality, so knowledge involves building models and testing them against new information.

? *If the world that we experience is a mental construct, how does this affect our ability to know what things are really like?*
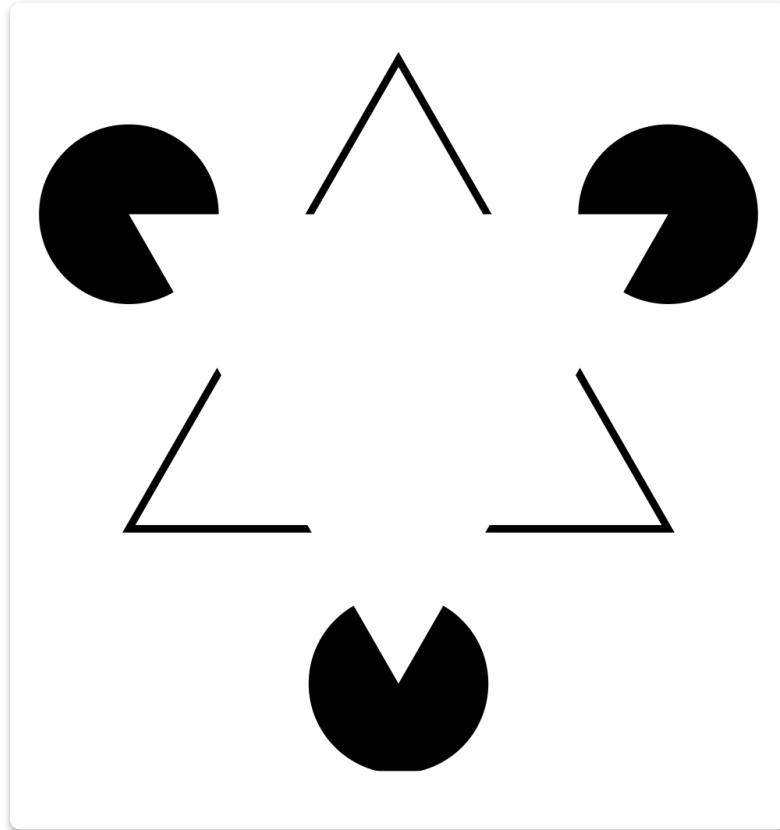
Completing the picture

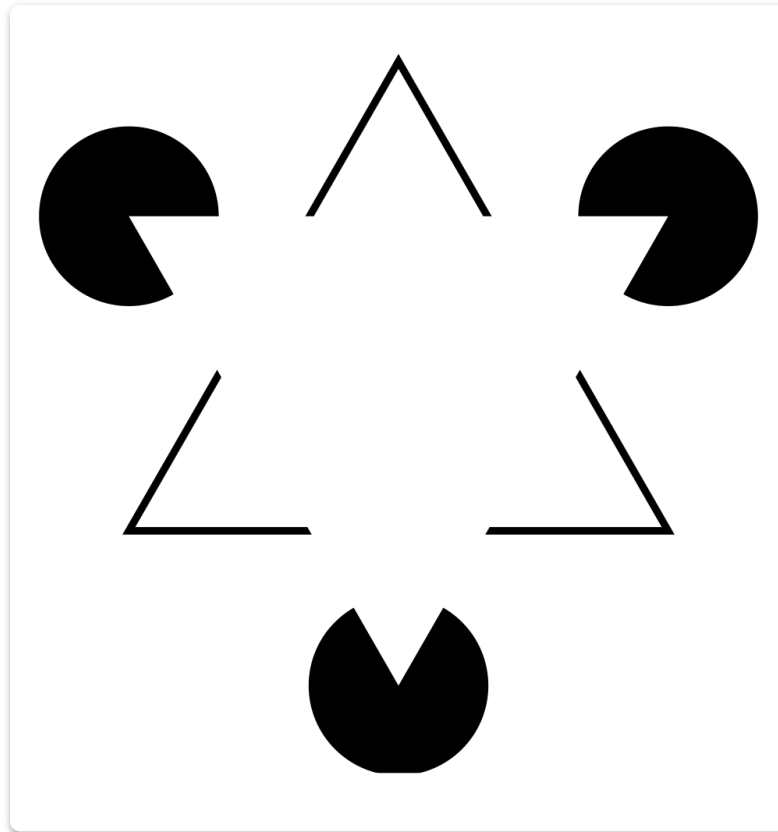# Completing the picture

Completing the picture

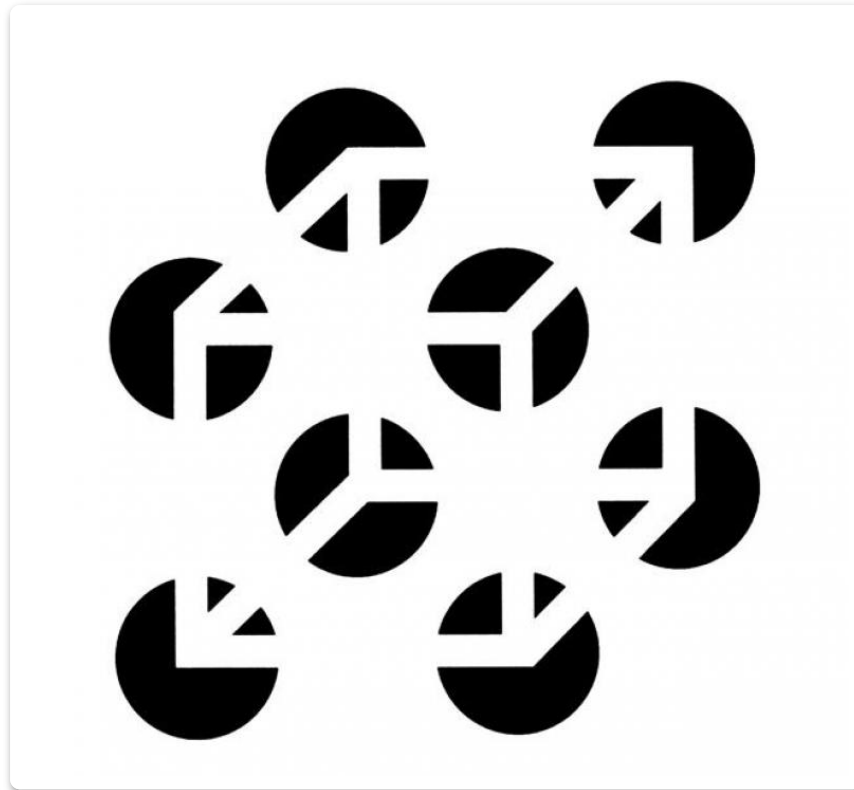*HINT: Can you see the dog?*

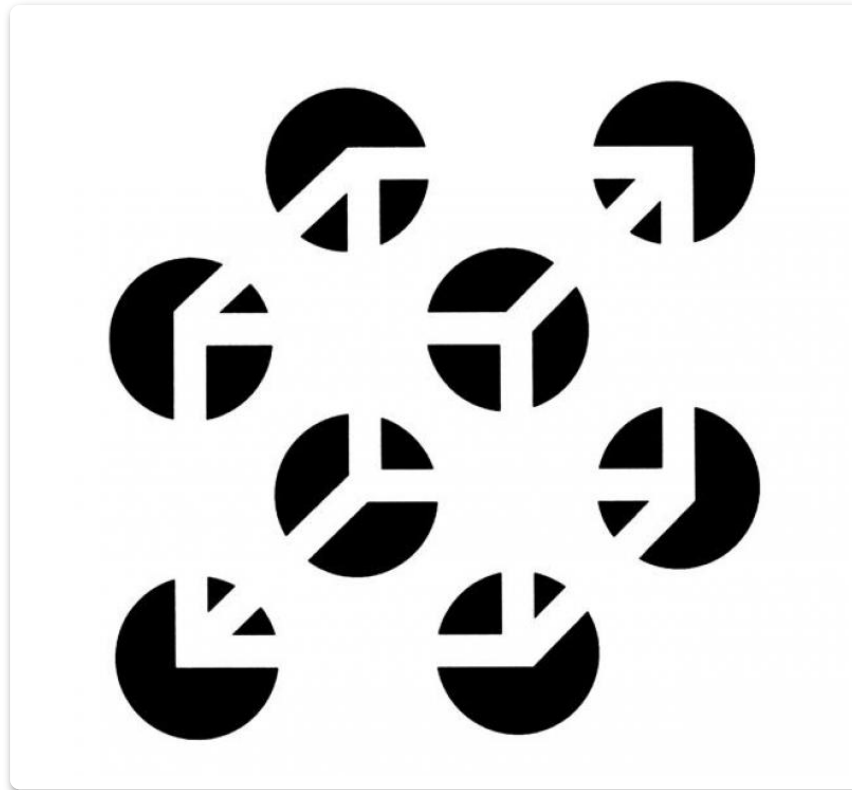# Completing the picture

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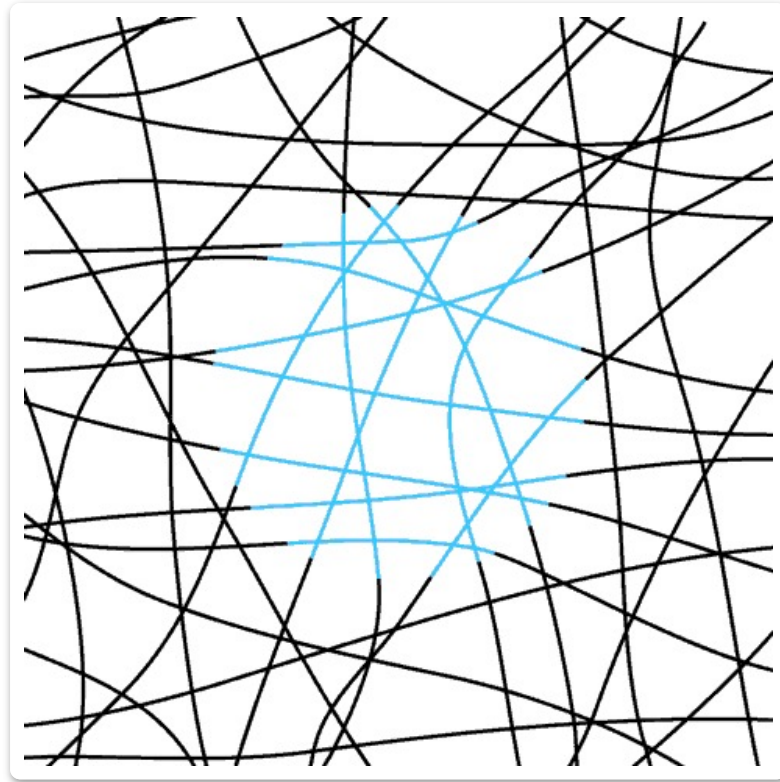*Is there a white triangle here or not?*

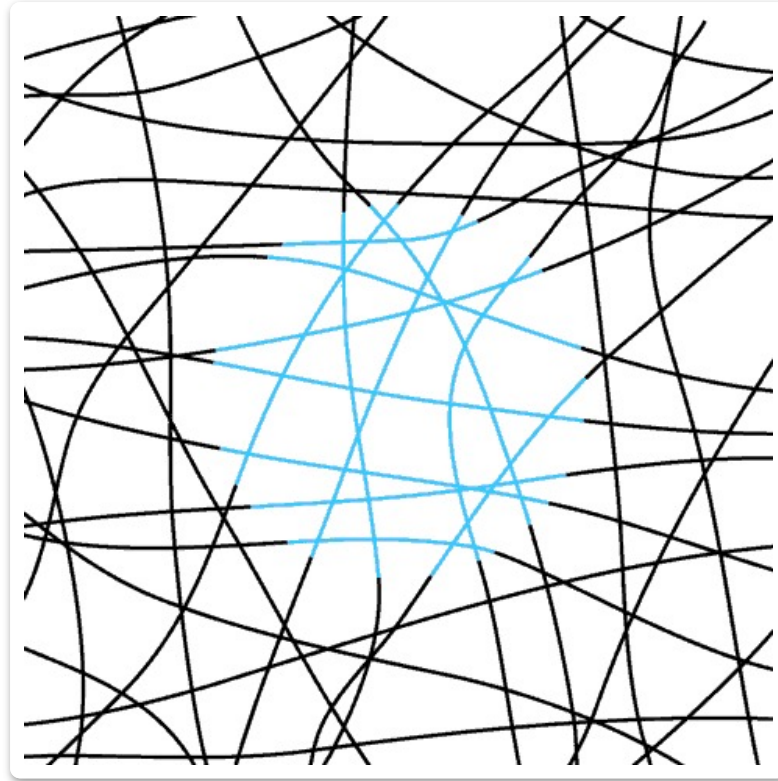# Completing the picture

Completing the picture

Are you looking up at the bottom of the cube or down at the top?
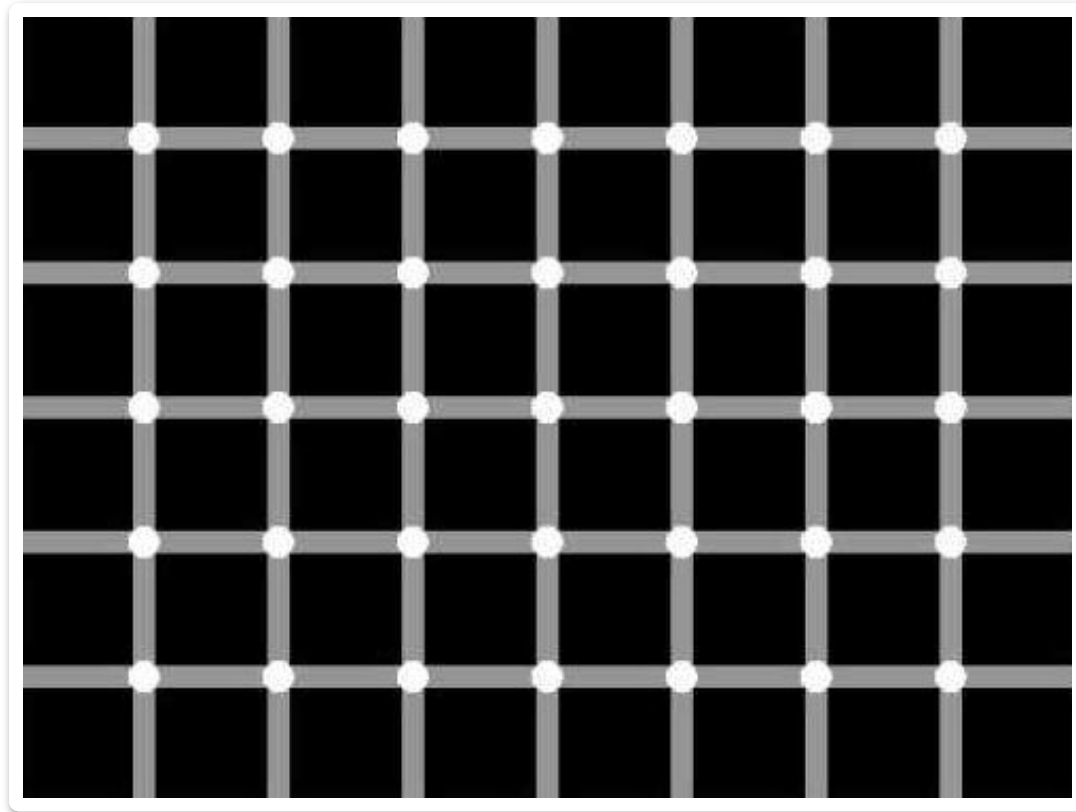
Completing the picture
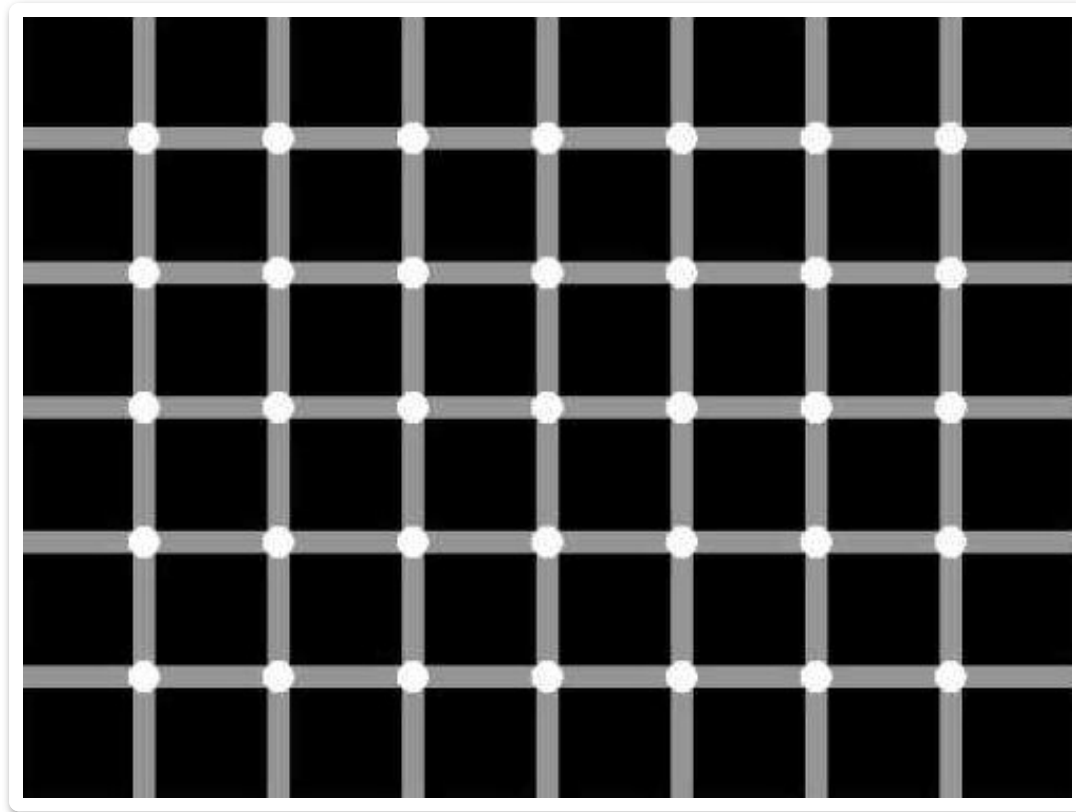
Completing the picture

Our visual systems soften the differences between contrasting elements if they seem to evoke a pattern.

Completing the picture

Completing the picture

Why does the color of the intersections change depending on whether you are looking straight at them or not?

Completing the picture

- Our minds are "anticipation engines" -- we identify patterns and use them to anticipate what happens next in time, space or action.

Completing the picture

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Completing the picture

- Our minds are "anticipation engines" -- we identify patterns and use them to anticipate what happens next in time, space or action.

- By default we leap to conclusions only later filtering them through critical thinking.

- The ease with which we can connect the dots enables us to thrive in complex and novel environments.

- It also leaves us vulnerable to seeing patterns that aren't really there.
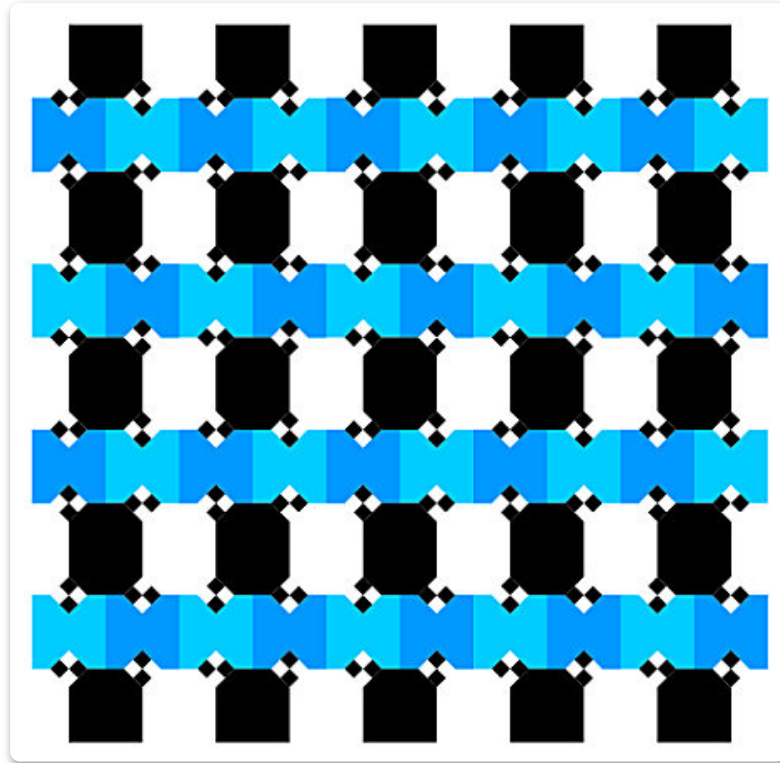
Orienting things in space

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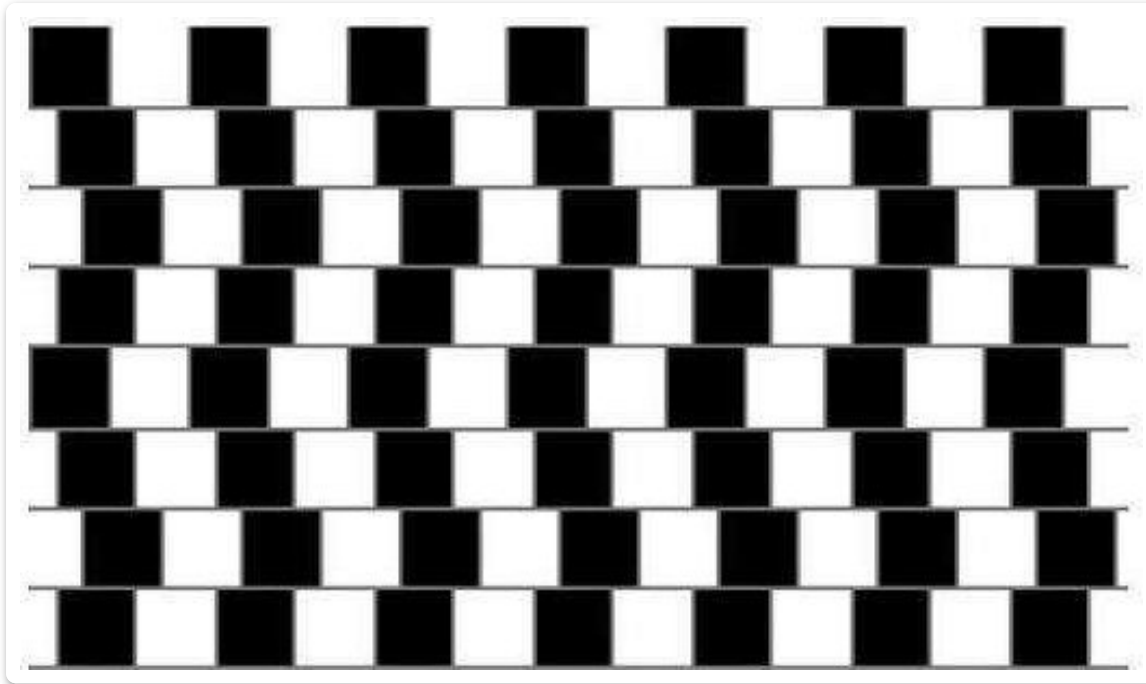
Orienting things in space
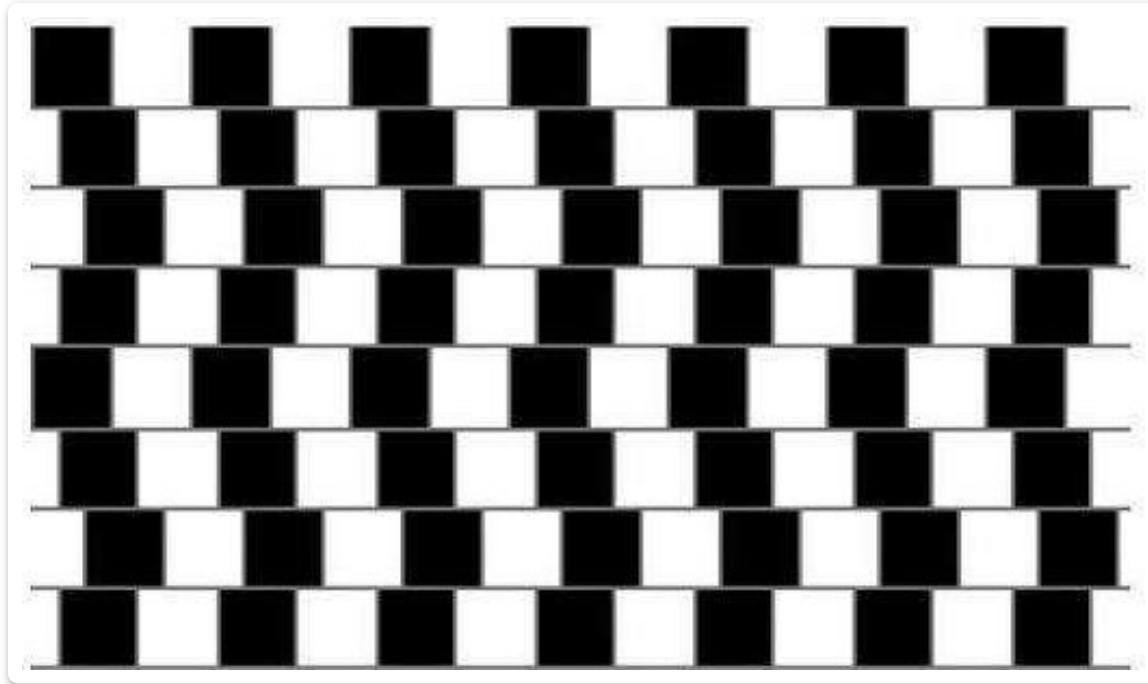
All horizontals are parallel. Check it with ruler! Why can't we SEE this even though we KNOW it?

Orienting things in space

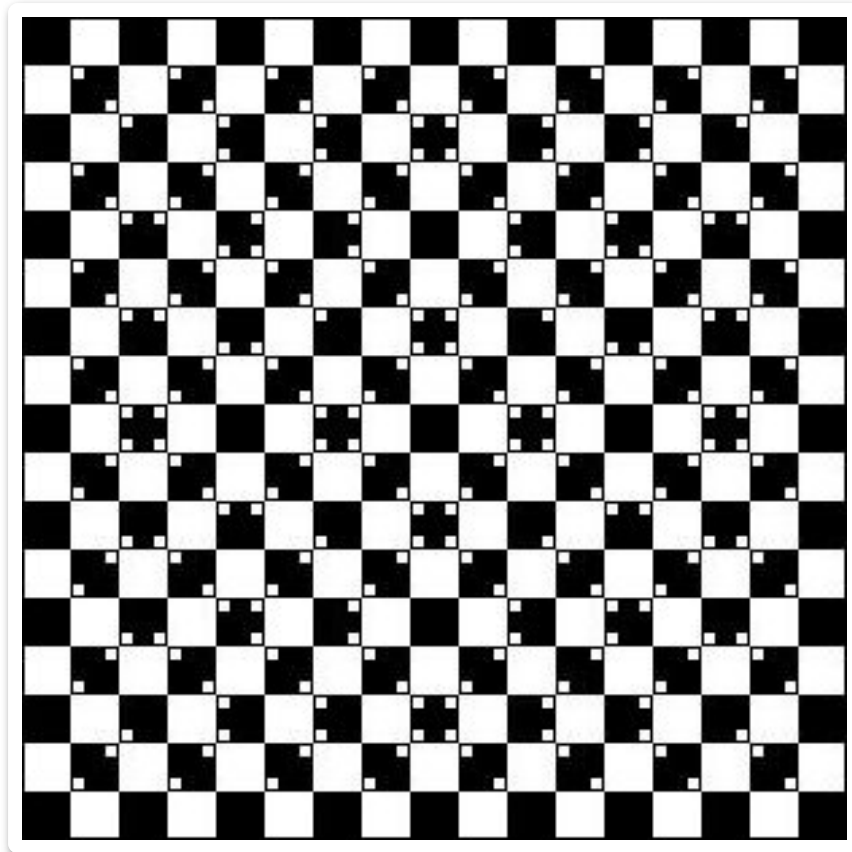# Orienting things in space
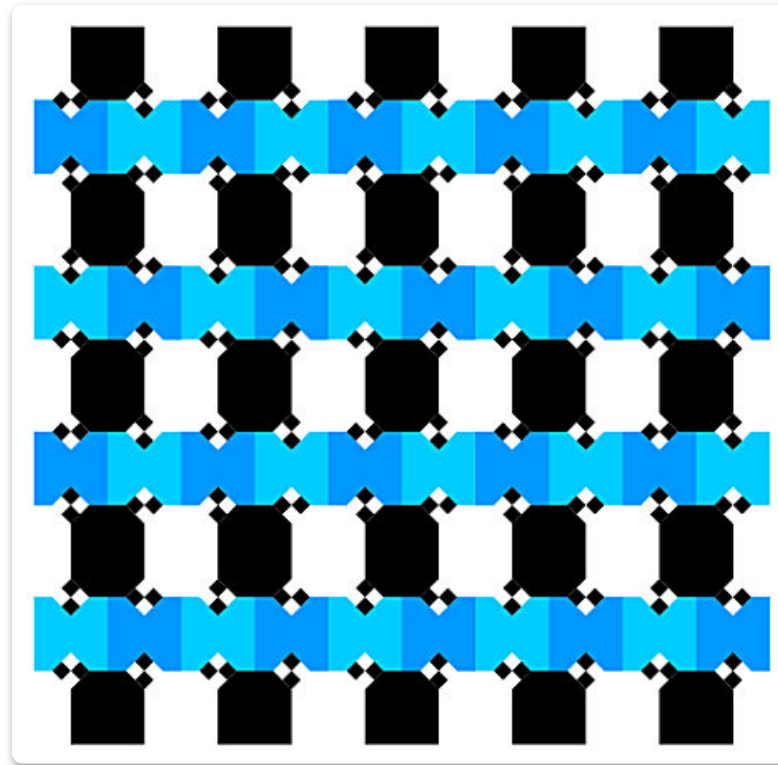
A more extreme case of how we interpret visual data spatially in response to small contextual cues.
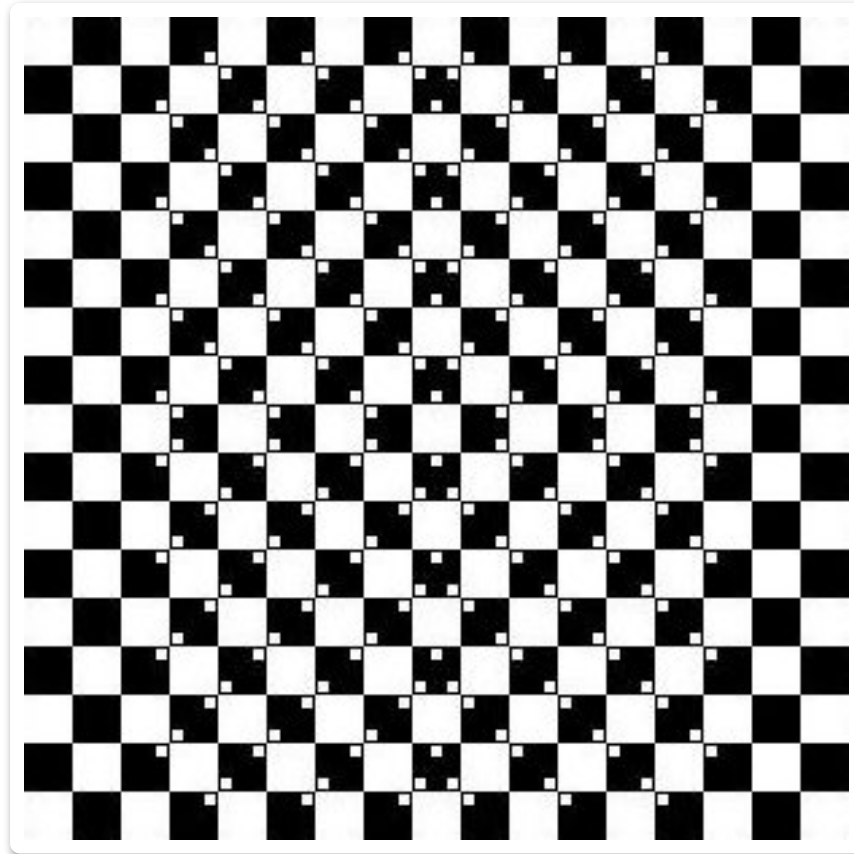
Orienting things in space
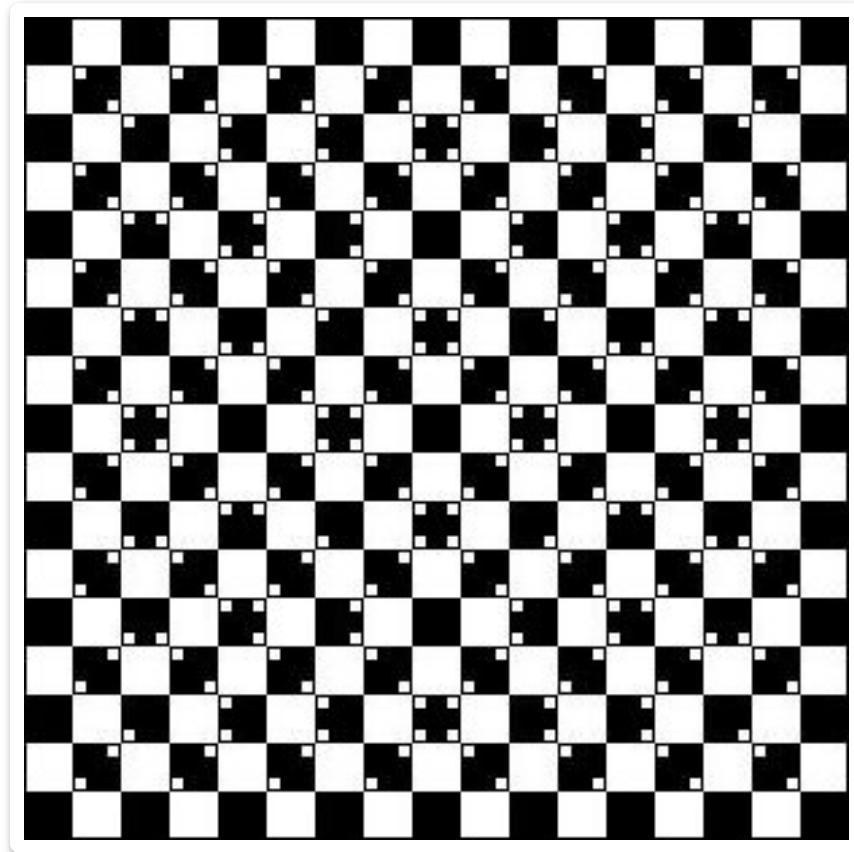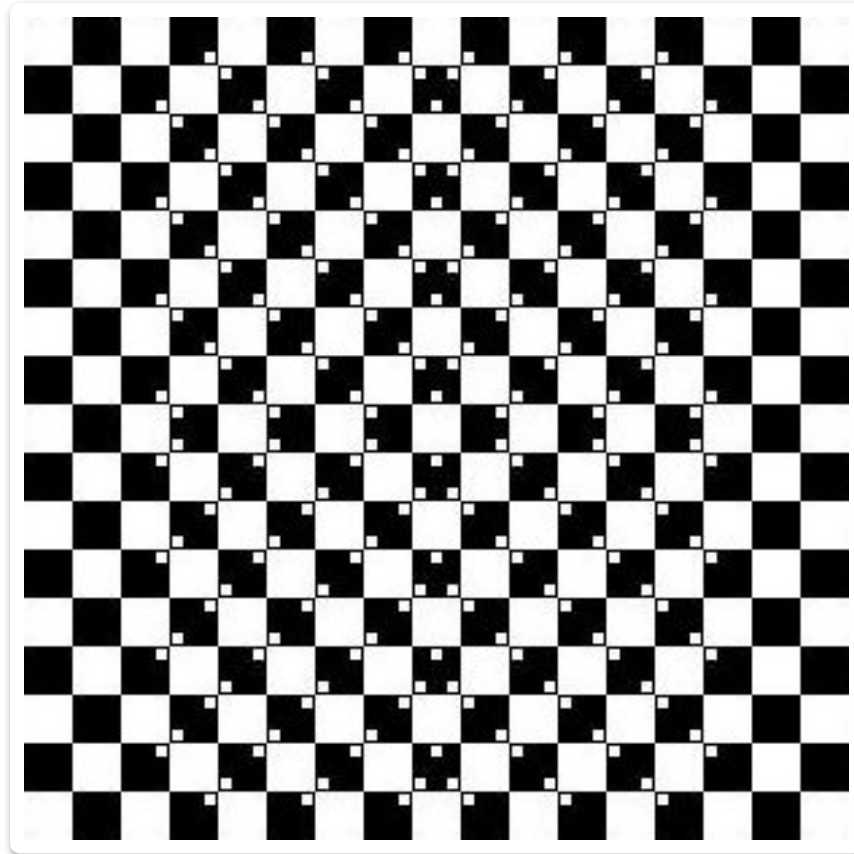
Orienting things in space
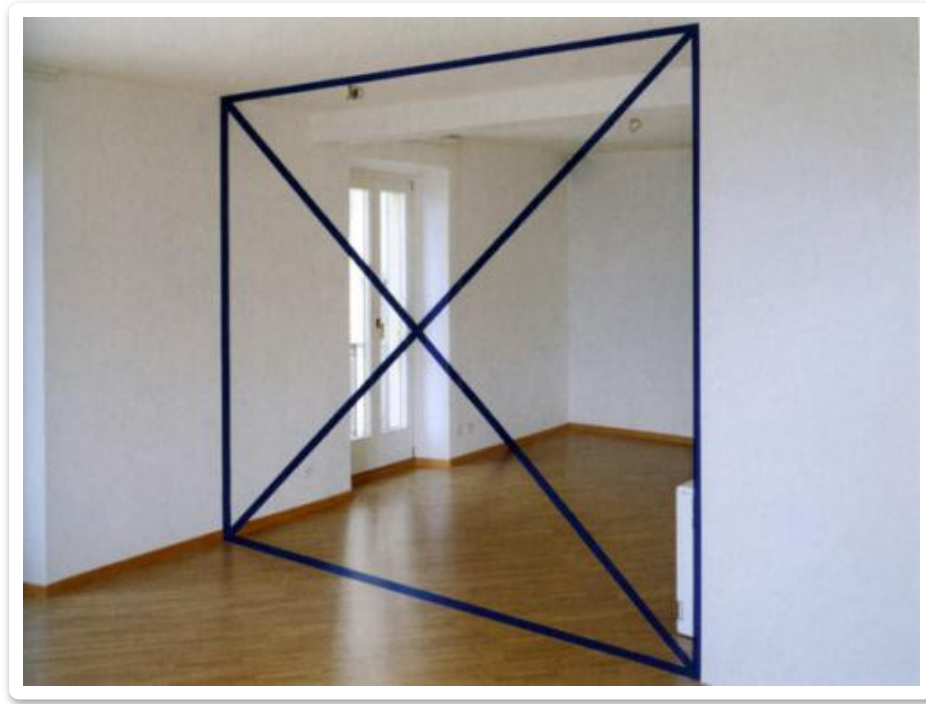

Changing these cues...

Orienting things in space

Orienting things in space

... changes our spatial perception.

Orienting things in space
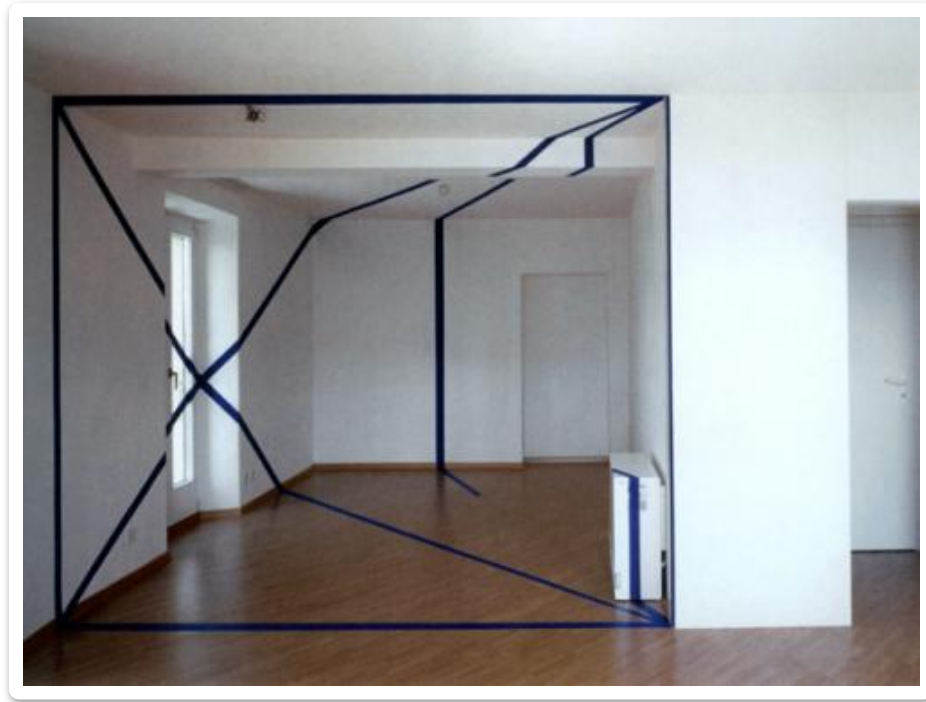
Orienting things in space
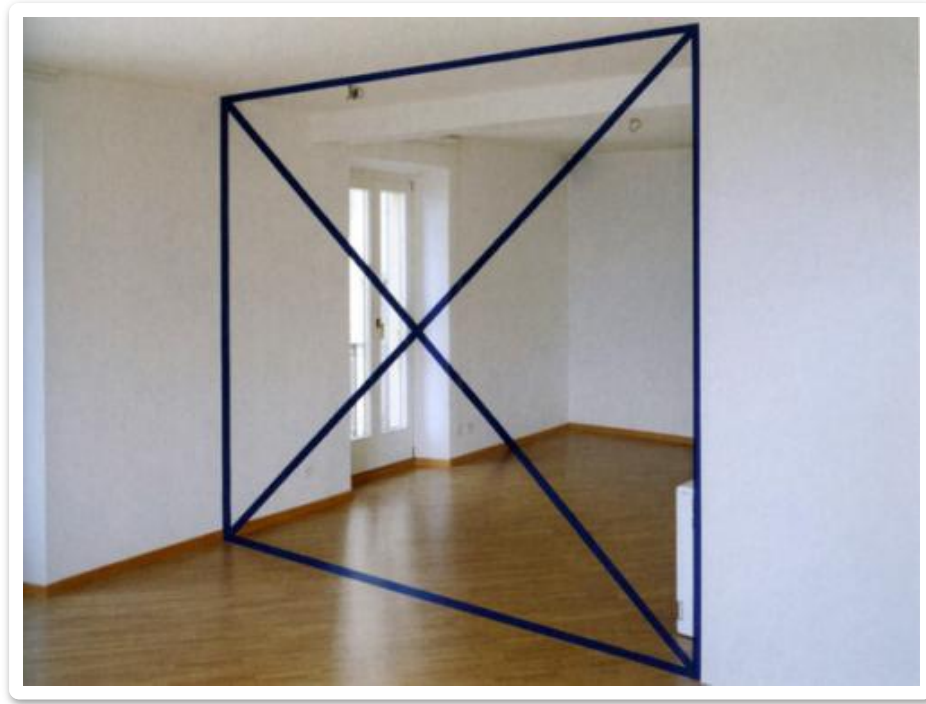
Sometimes an illusion depends on...

Orienting things in space

Orienting things in space

… us occupying one particular perspective.

Orienting things in space

Orienting things in space

Only from such a perspective can we see the illusion.

Orienting things in space

Orienting things in space

It falls apart with a simple change of viewpoint.
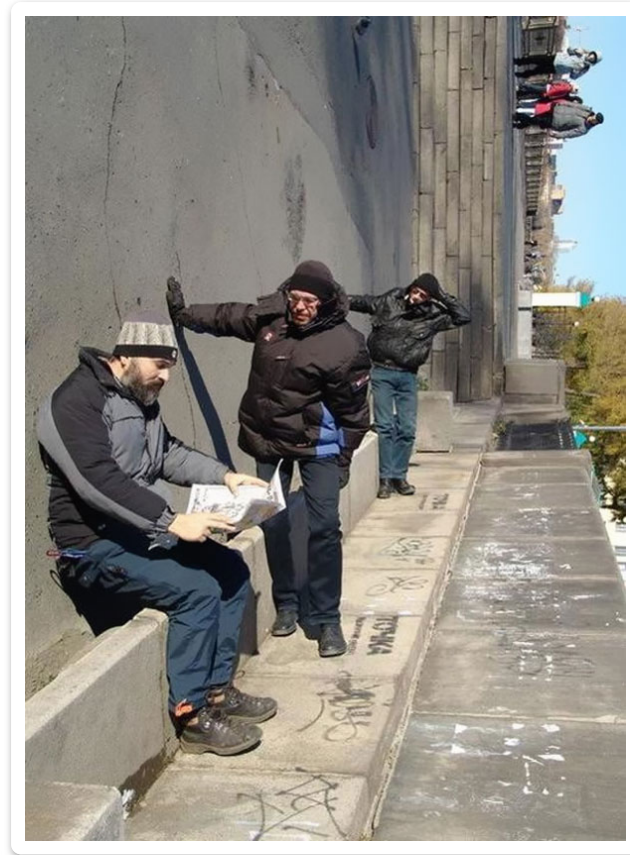
Orienting things in space

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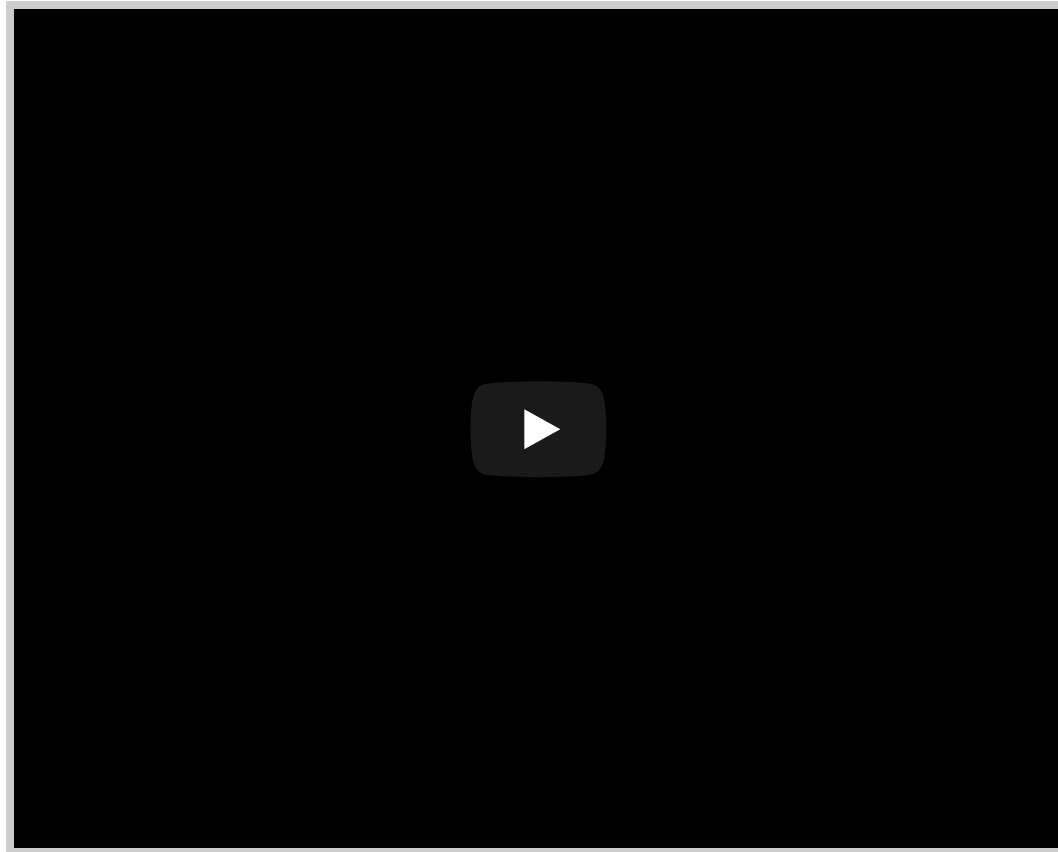*Some artists specialize in tricking our minds into rendering flat images as 3-dimensional objects.*

Orienting things in space
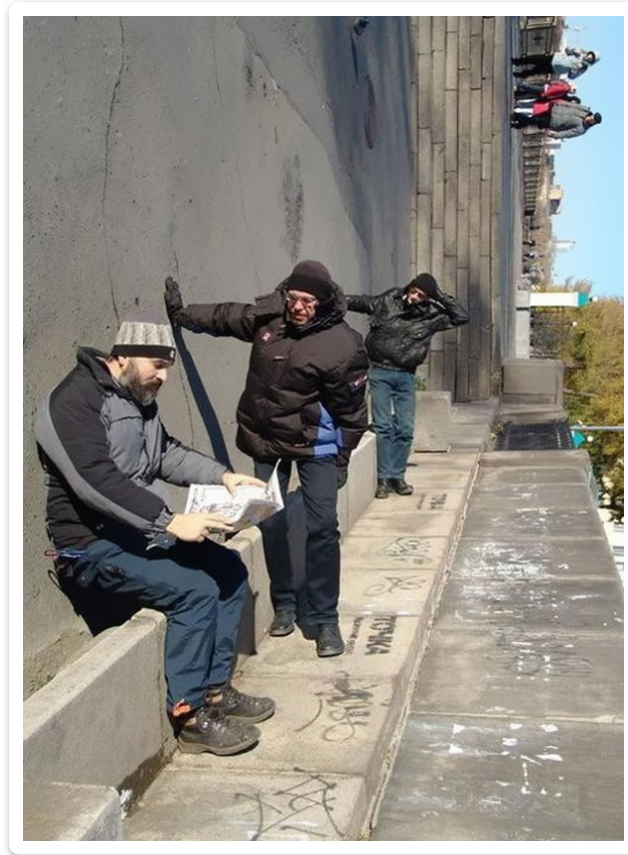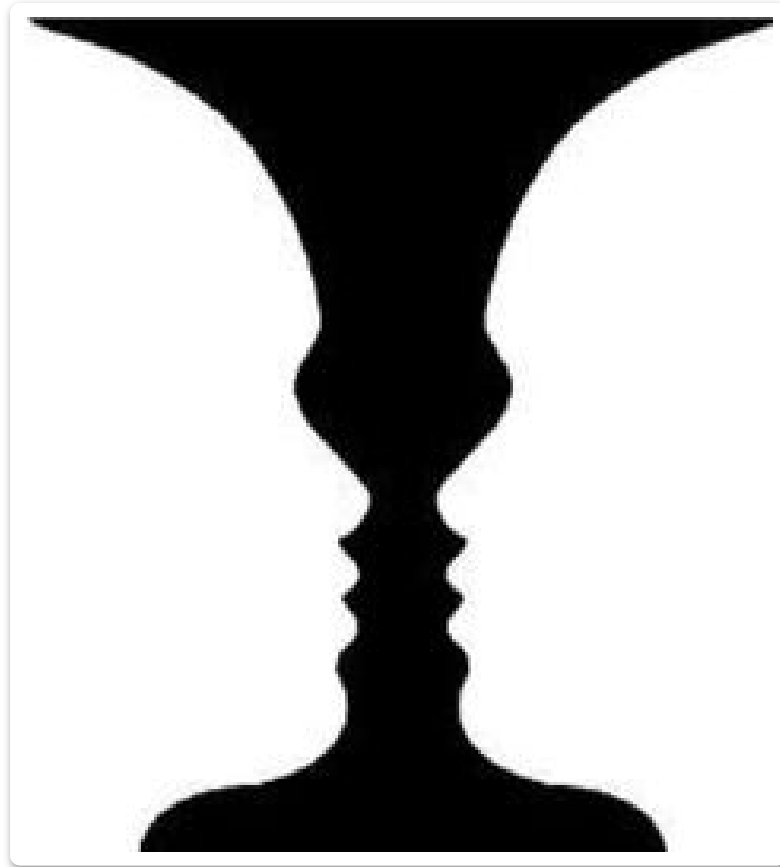
Orienting things in space

Or creating ambiguous scenes.
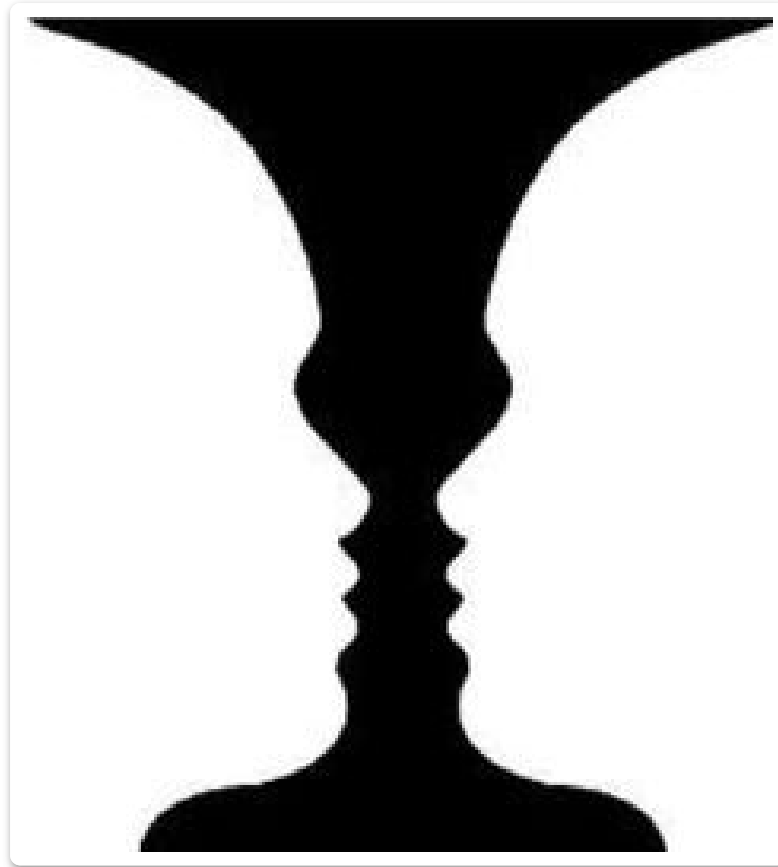
Orienting things in space

The Ames room is an illusion relies on our senses having been "tuned up" to expect parallel walls, floors and details in interior spaces.

Interpreting objects

Interpreting objects

Interpreting objects

We often have choices about which mental model best captures the reality.

Interpreting objects

Interpreting objects

We can flip from seeing this as a duck to seeing it as a rabbit at will.
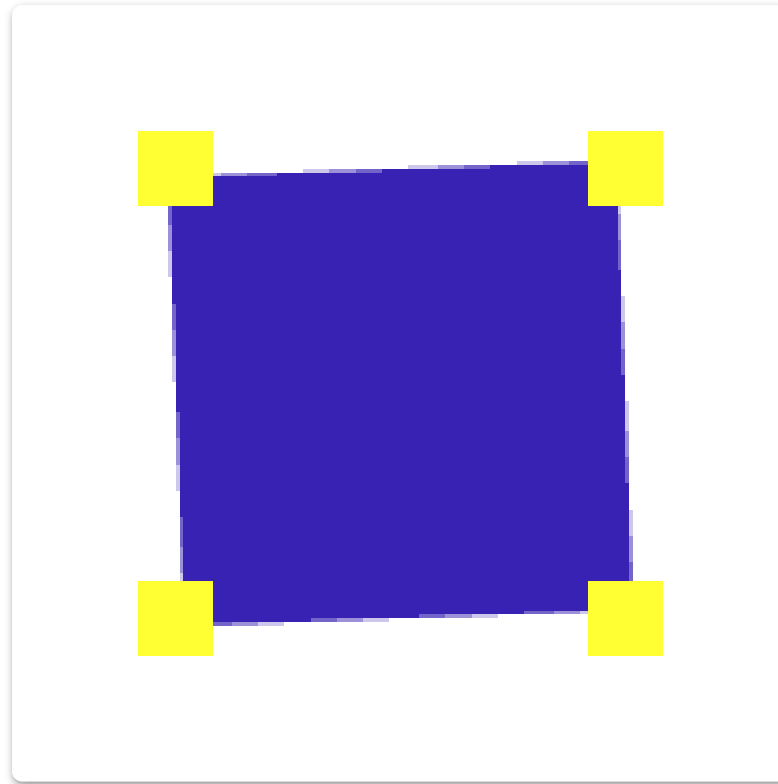
Interpreting objects

Interpreting objects

Often unconscious "decisions" enable us to structure input as a coherent and meaningful image or scene.
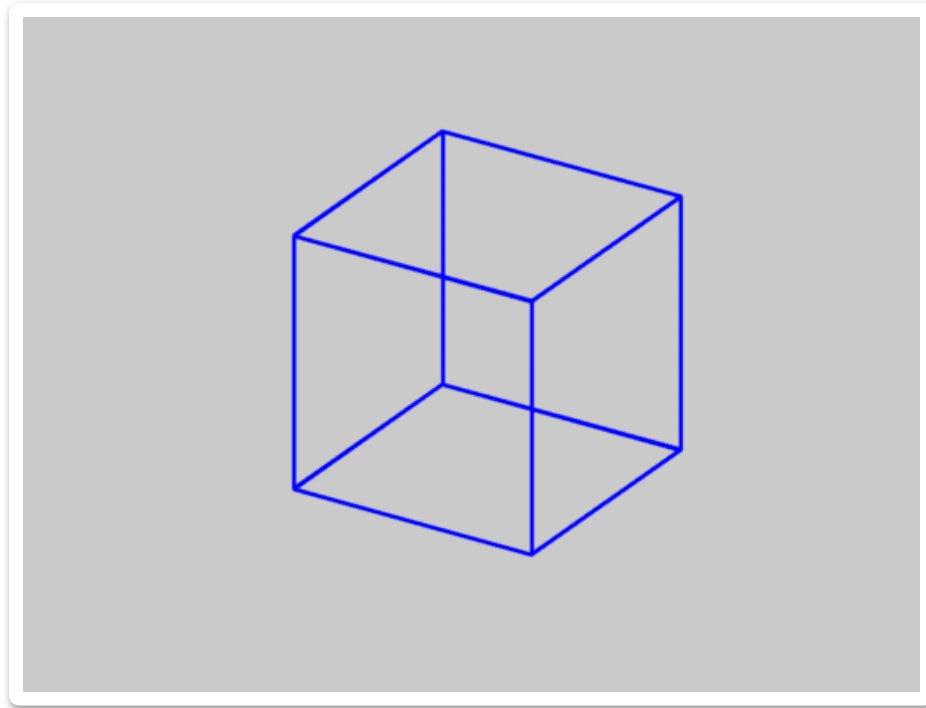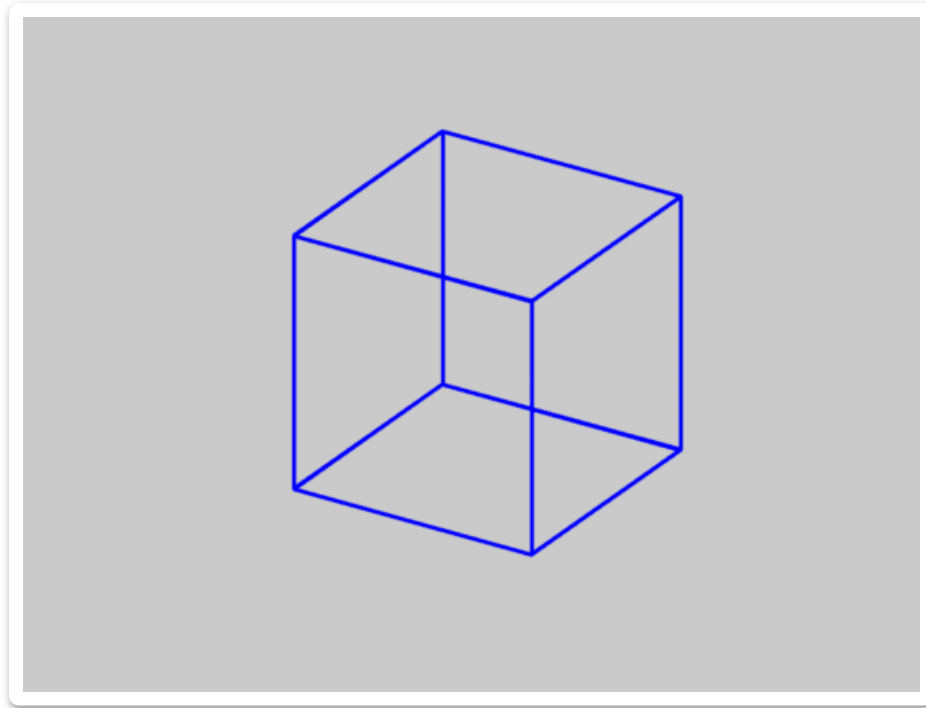
Interpreting objects
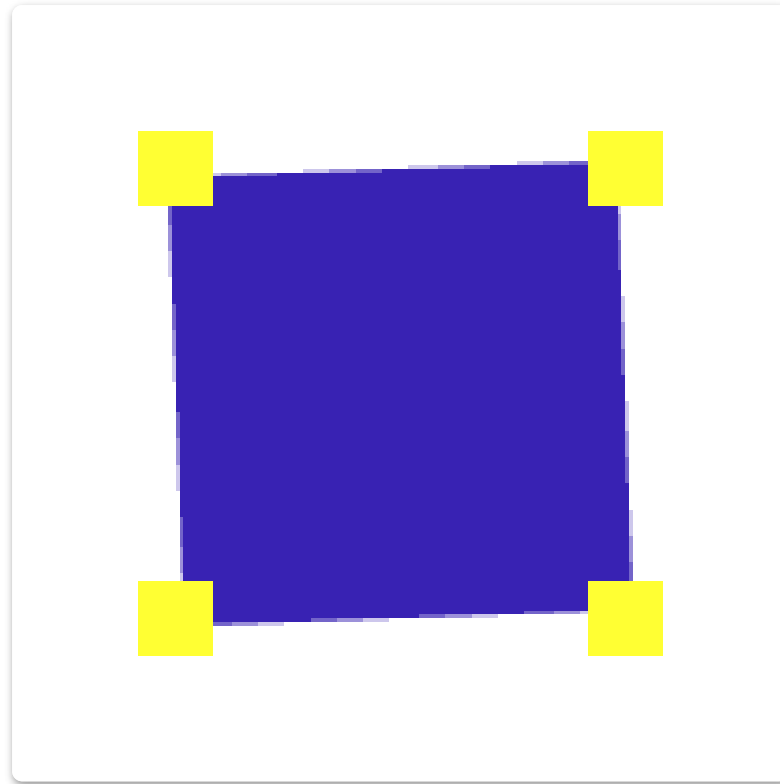
Interpreting objects

Context can determine how we perceive motion and change.
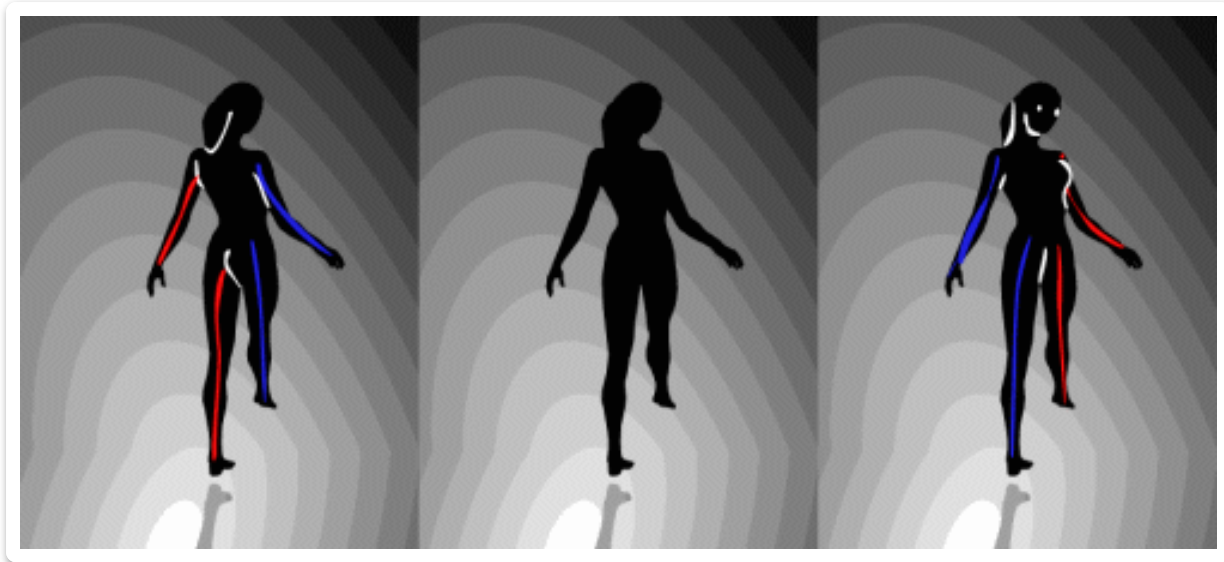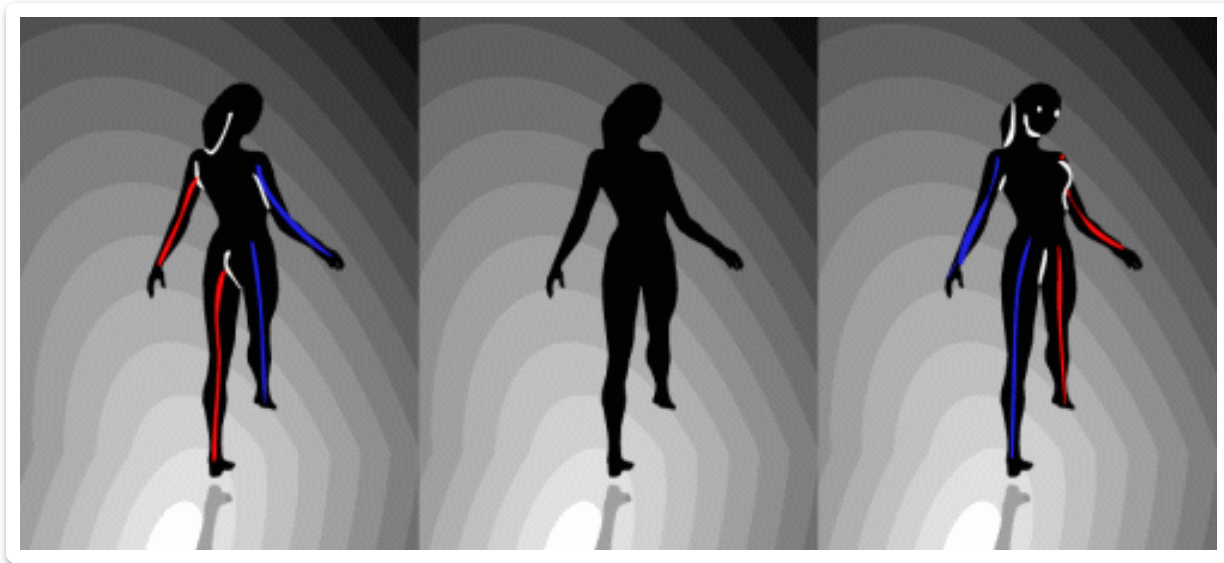
Interpreting objects

Interpreting objects

Are we looking down at the top or up at the bottom of tis cube and which way is it rotating anyway?
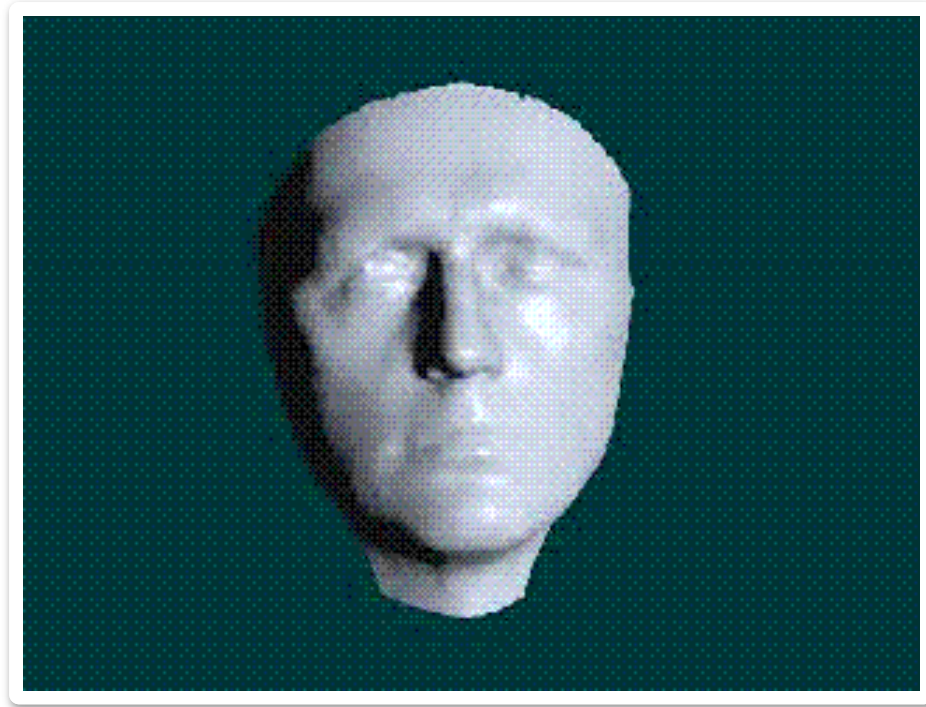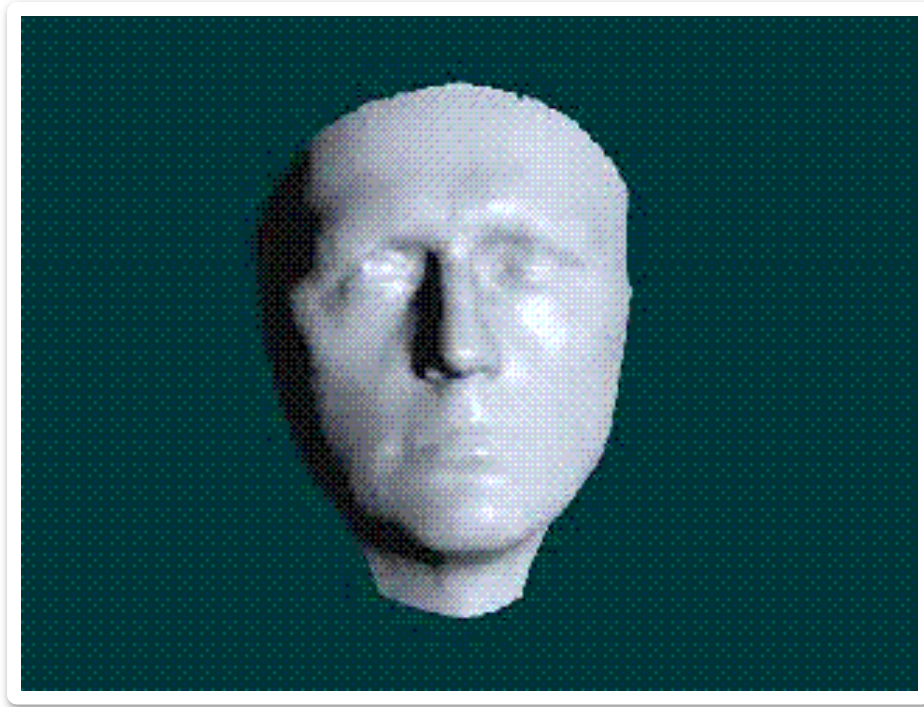
Interpreting objects

Interpreting objects

Subtle visual cues on the side dancers cause the direction of rotation to change.

Interpreting objects

Interpreting objects

Since we never see behind anybody else's face we can't see the back of the mask as hollow. Our brains compensate by switching direction of apparent motion.
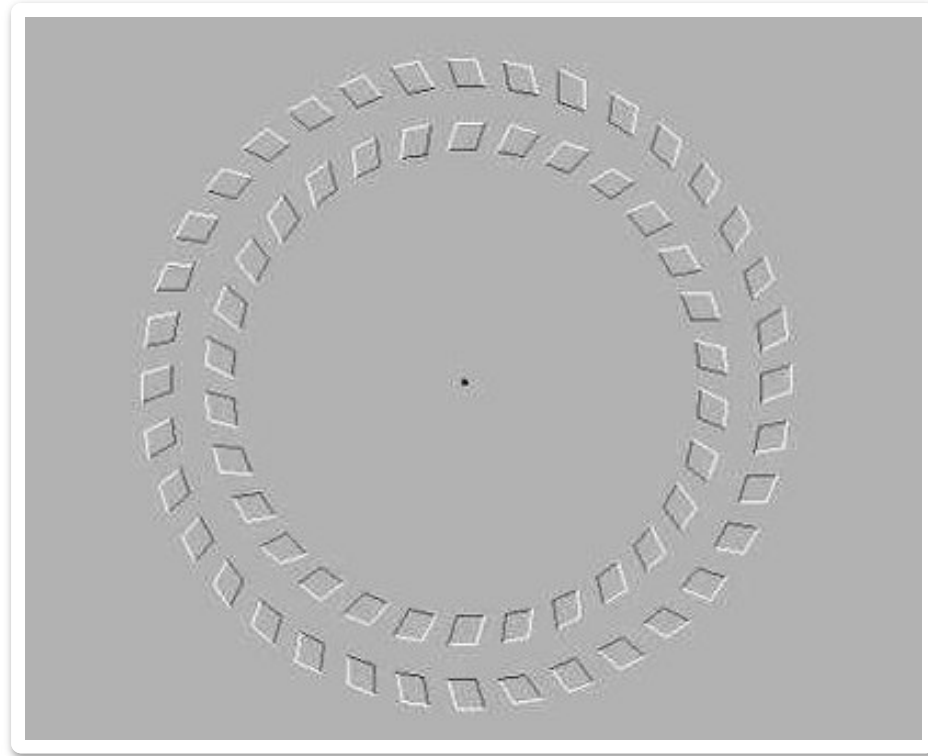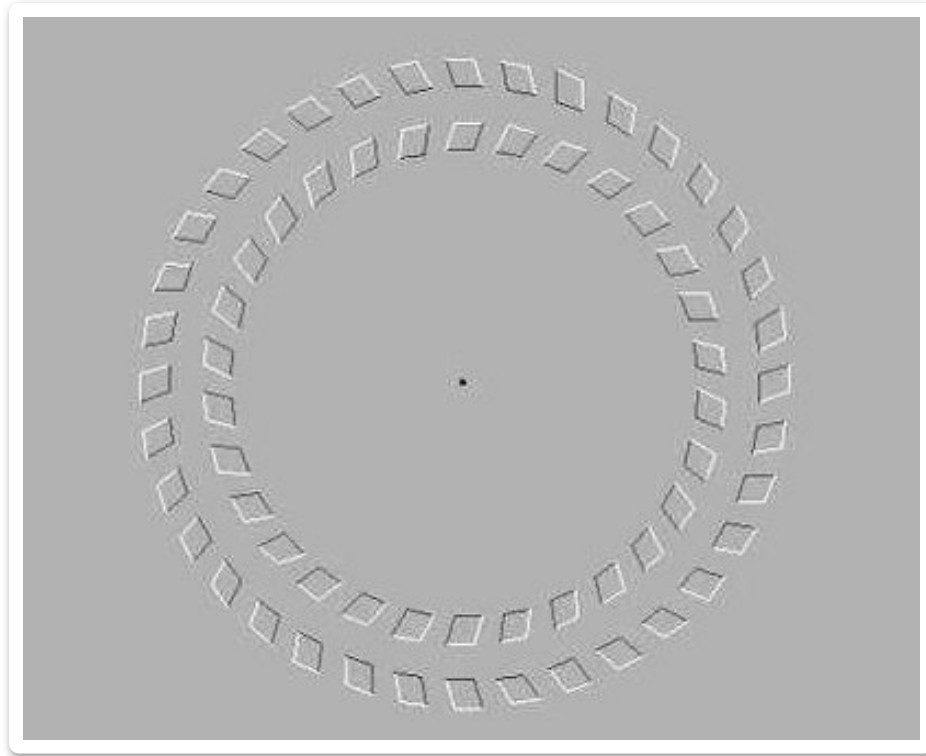
Interpreting objects

Interpreting objects

When exactly do figure and ground reverse?

Perceiving motion
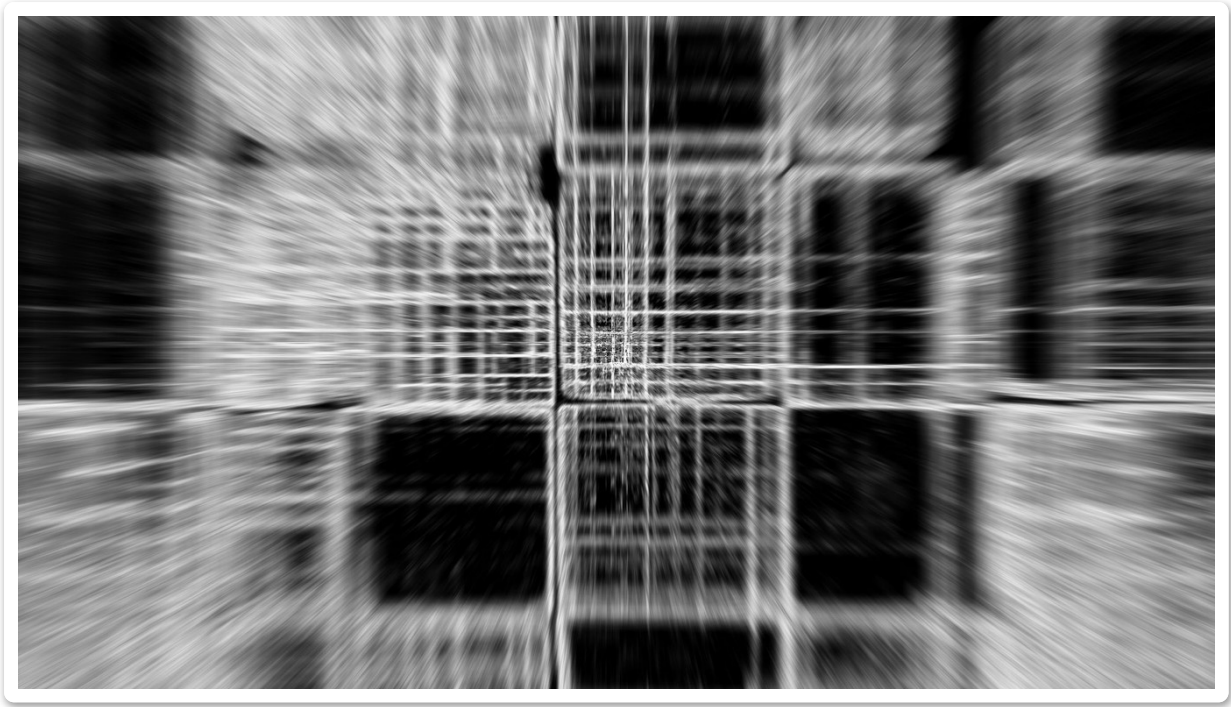
Perceiving motion
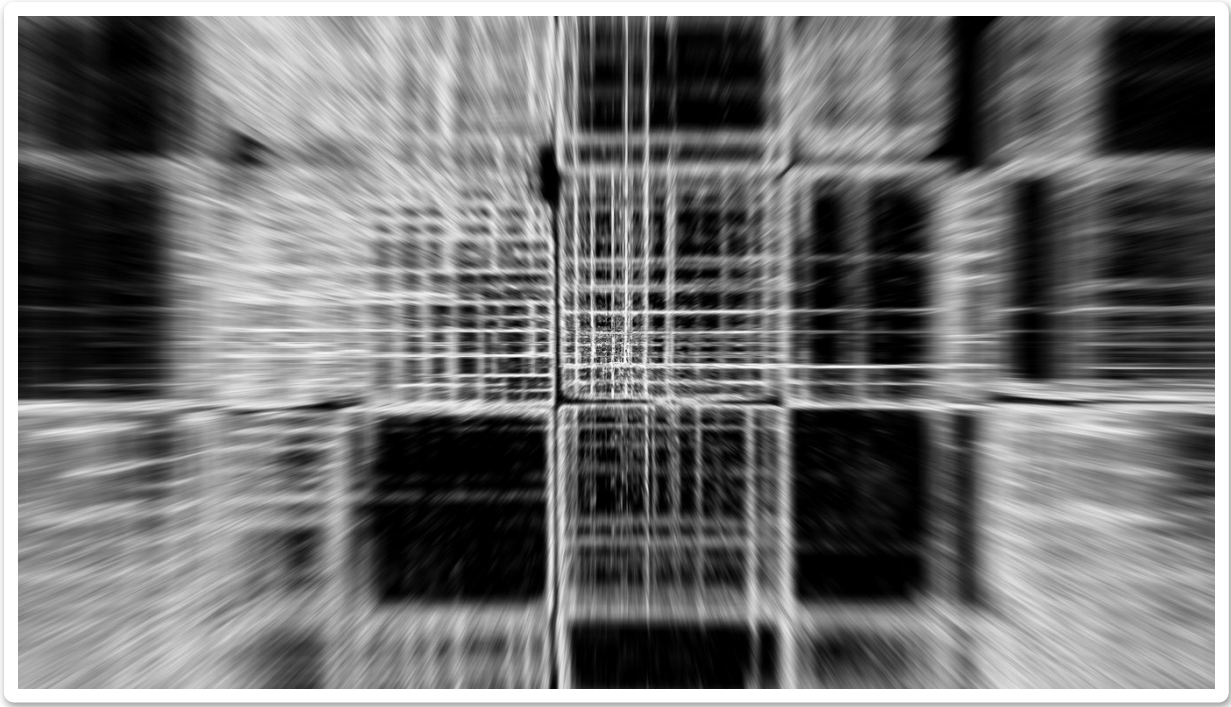
Perceiving motion

Focus on the dot in the middle and move year head back and forth. What do you notice?
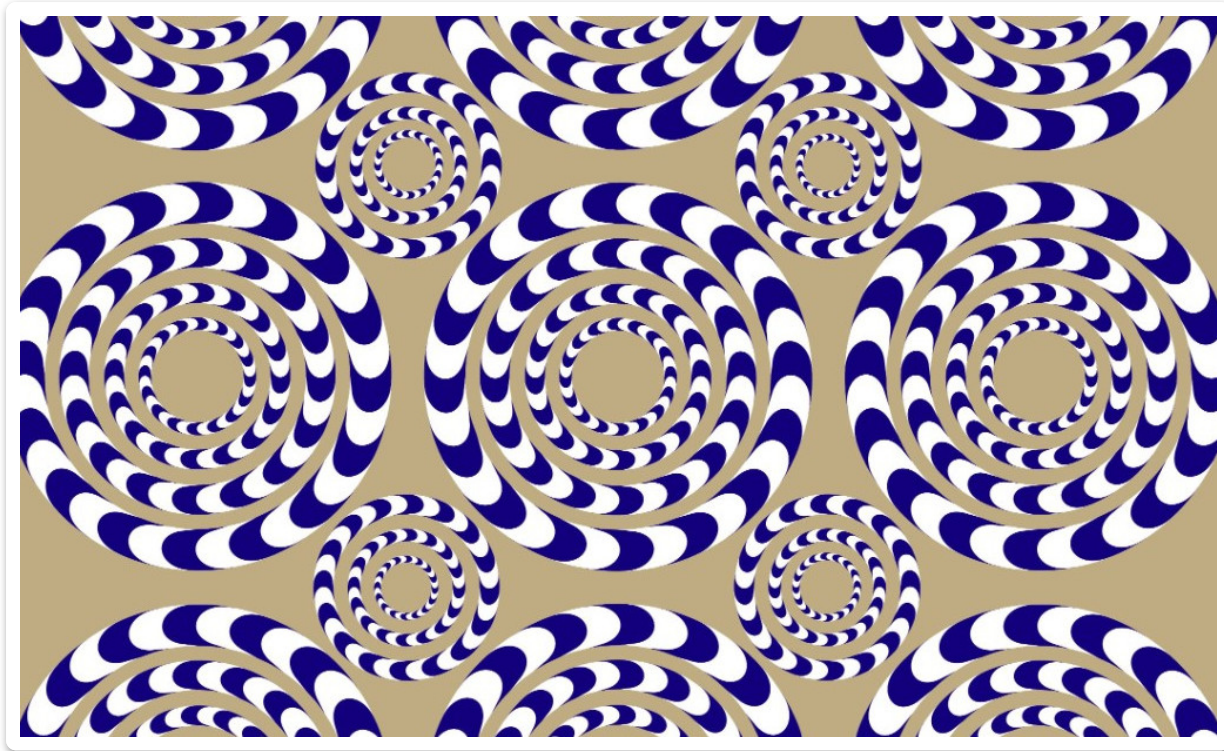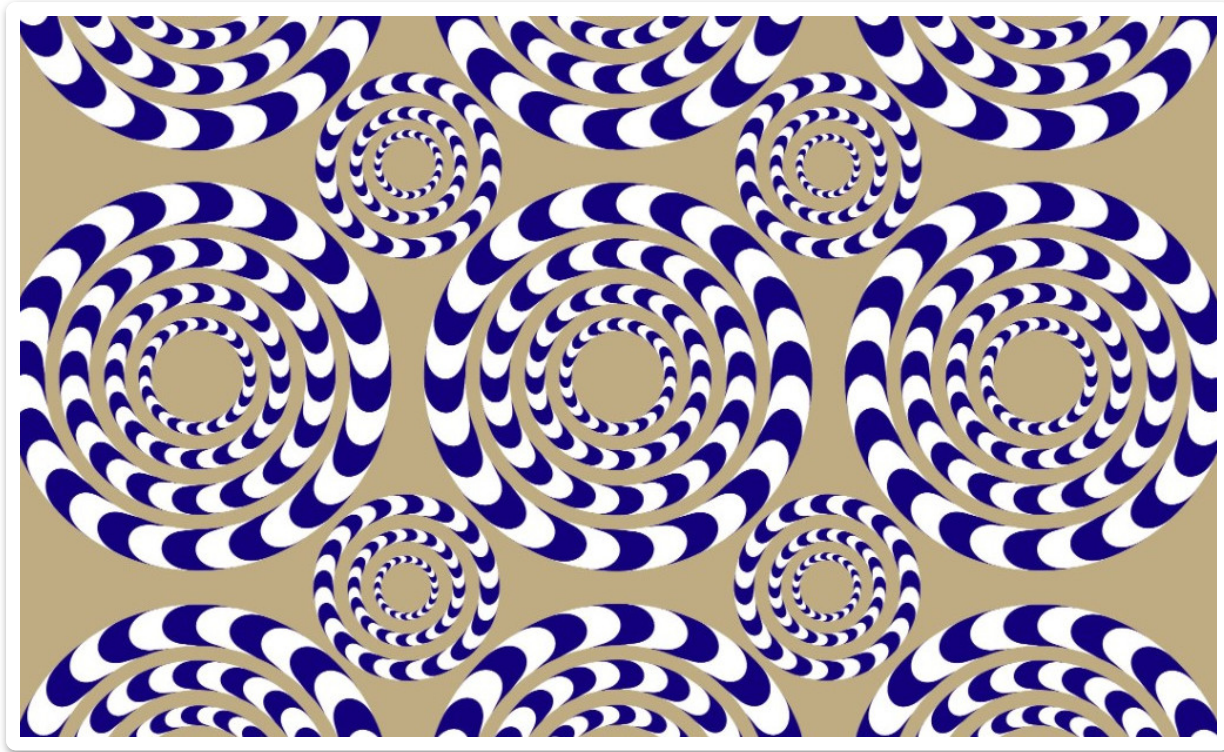
Perceiving motion

Perceiving motion

Some static images suggest motion with patterns of distortion and displacement.
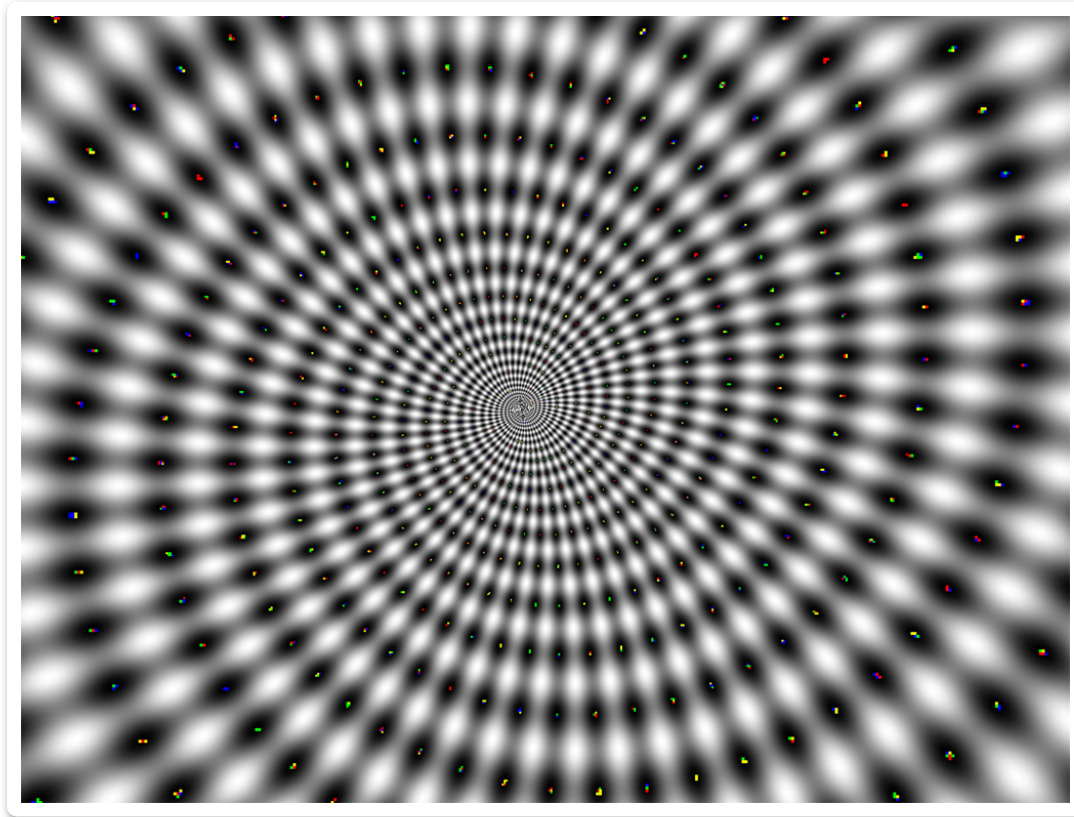
Perceiving motion
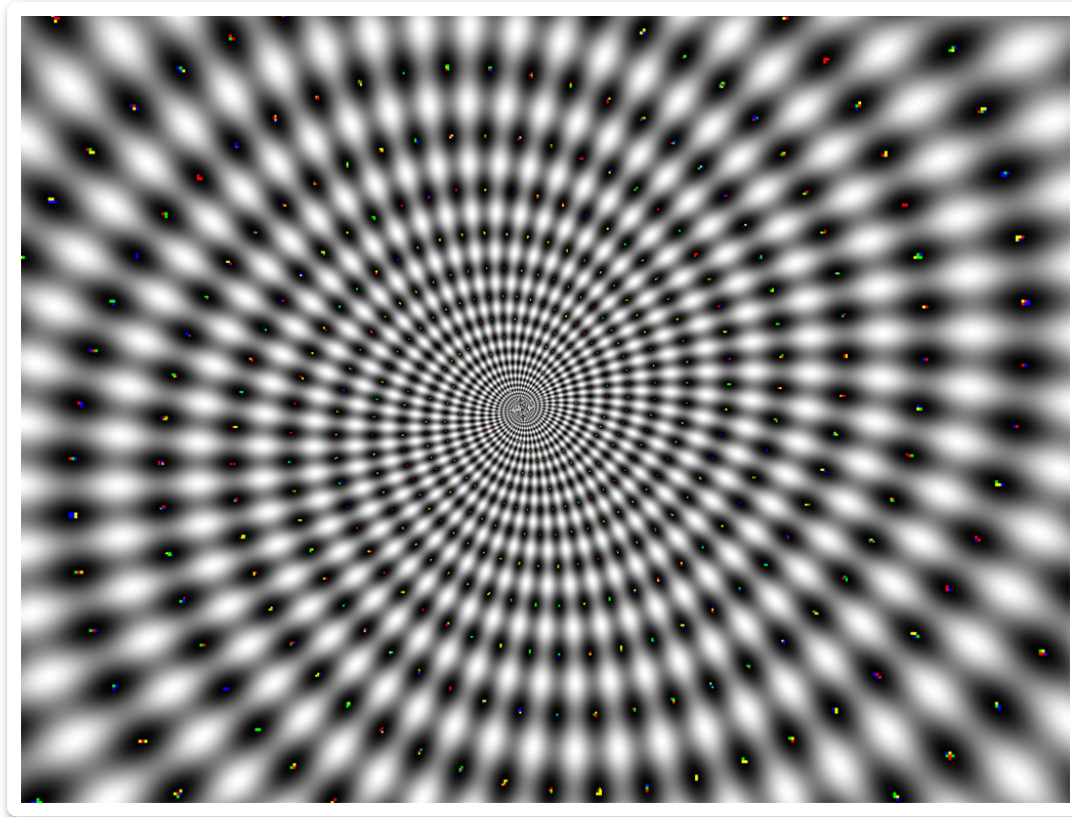
Perceiving motion

When our eyes see motion but our bodies register stillness we can feel ill....
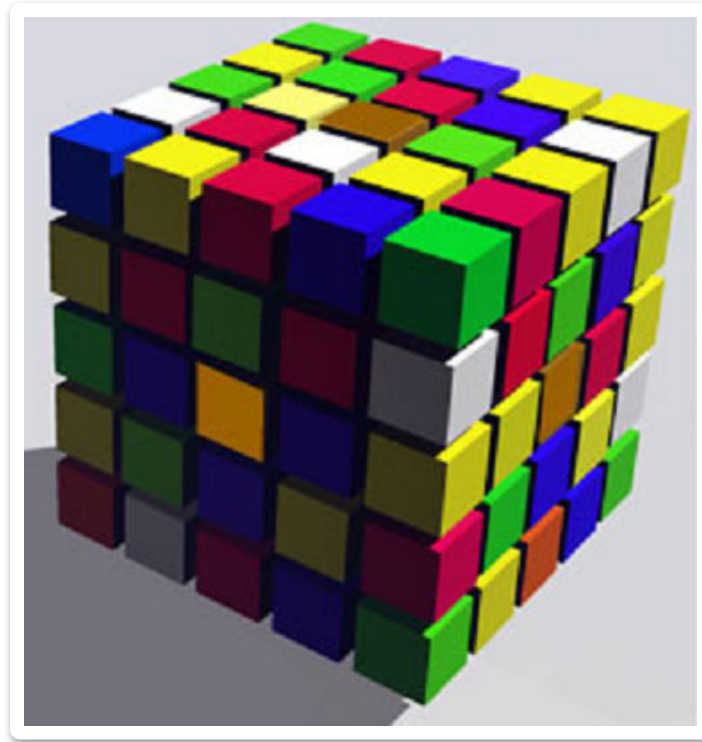
Perceiving motion

Perceiving motion

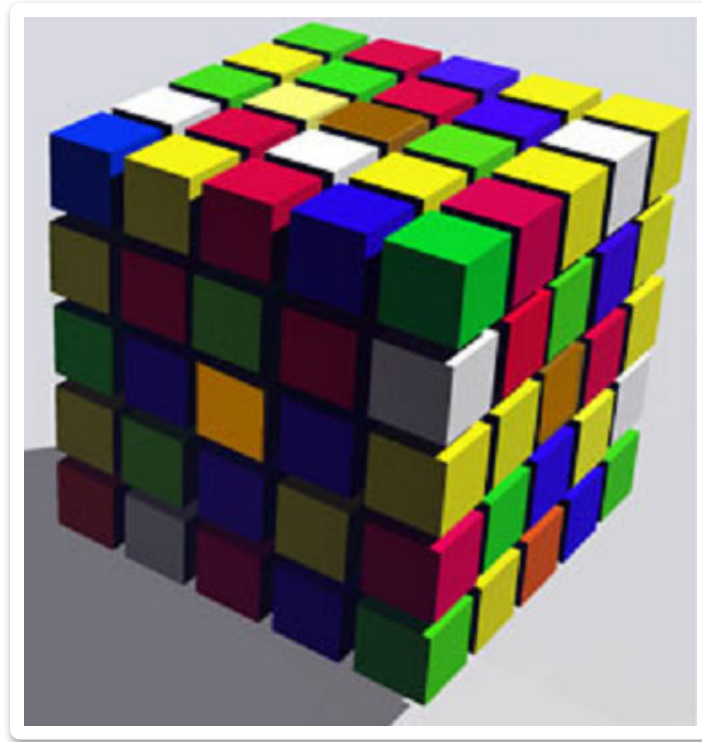*… This is because we evolved to associate this mismatch with poisoning, which often results in perceptual/motor disconnects. Consider the effects of alcohol.*
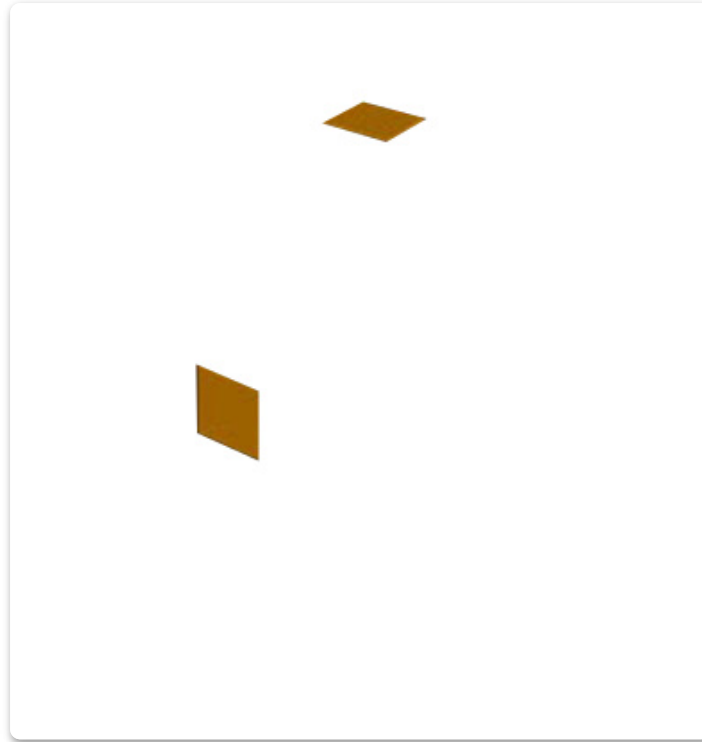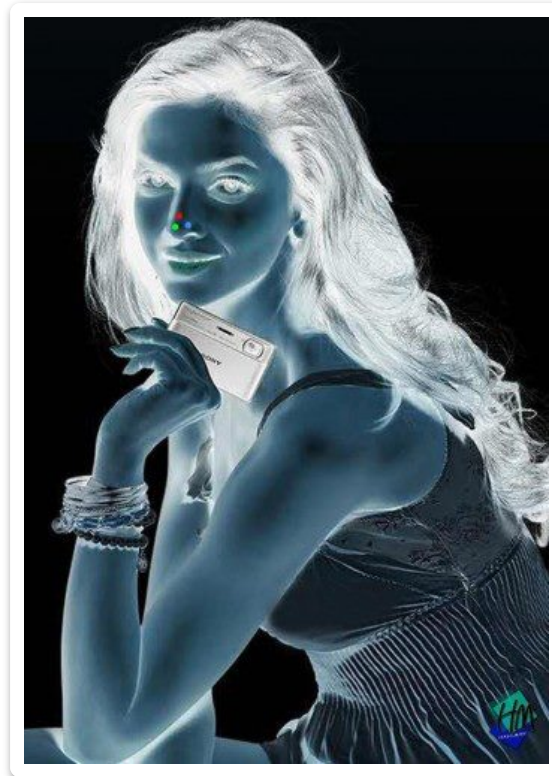
Perceiving color

Perceiving color

Perceiving color

Are the center squares on the faces in the light and the shadow different colors...
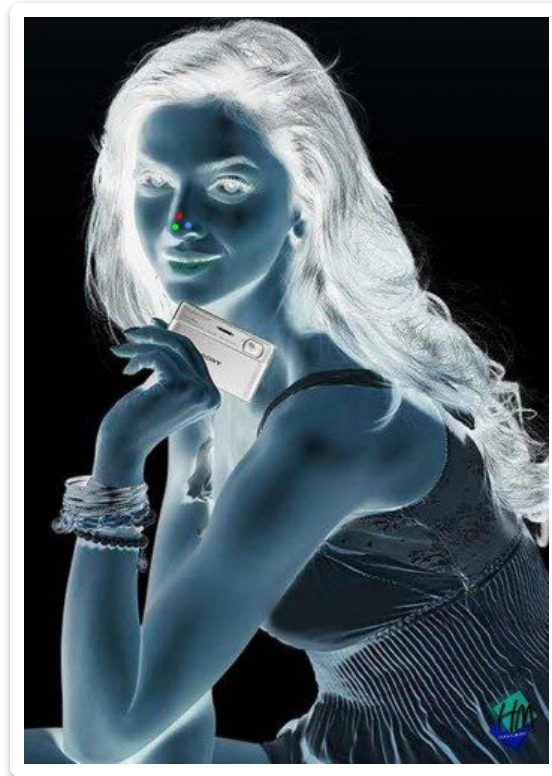
Perceiving color

...or the same color?
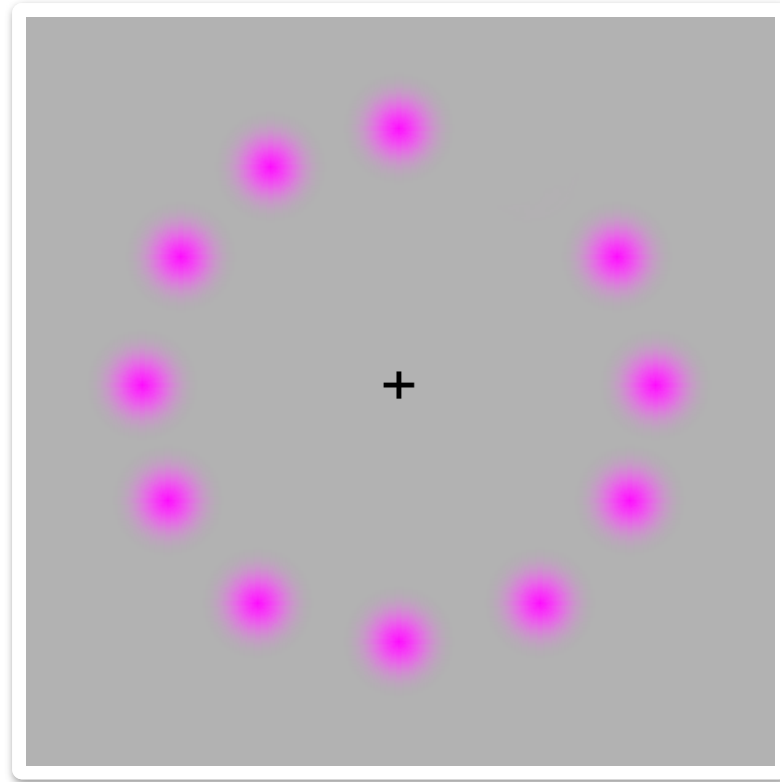
Perceiving color

Perceiving color

Stare at the colored dots on her nose for 30 seconds then go to the next slide while holding your eyes still.

Perceiving color

Perceiving color

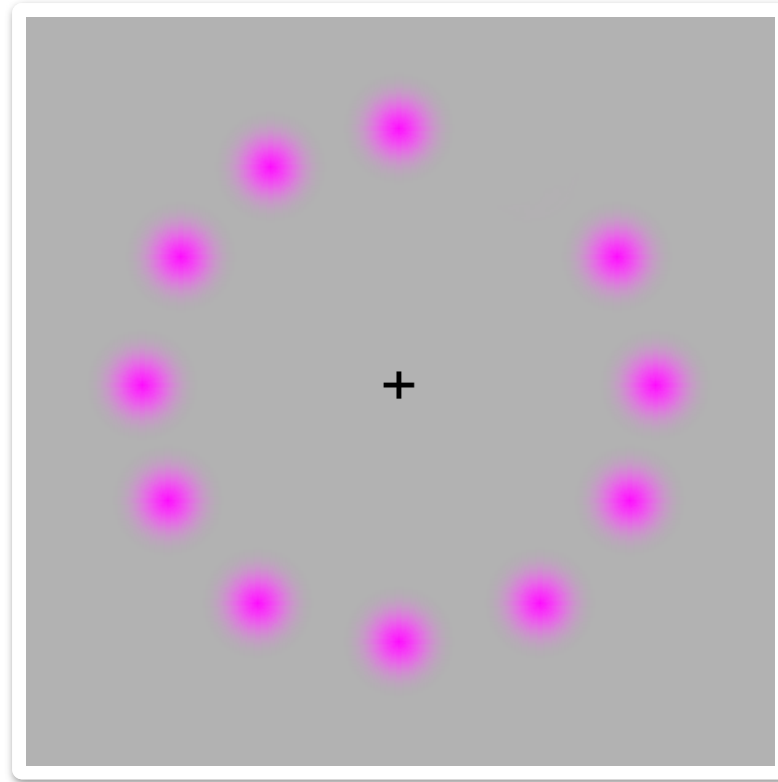*What did you just see?*

Perceiving color

Perceiving color

Image and after-image are opposite colors which cancel each other out. What happens when you fix your gaze on the plus sign in the middle?

Perceiving color

Perceiving color

We wouldn't be done here without "The Dress That Broke The Internet" in 2017. It is of course colored white and gold.

find out more

- Perception and Perceptual Illusions: explores some of the mechanisms behind the scenes.

- 136 Optical Illusions: lots of examples and explanations of the causal mechanisms.

Credits

Built with:

Rstudio

xarignan html presentation framework

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