Creative Computing II

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Autumn 2010, Wednesdays:
10:00–12:00: RHB307 & 14:00–16:00: WB316
Winter 2011, TBC

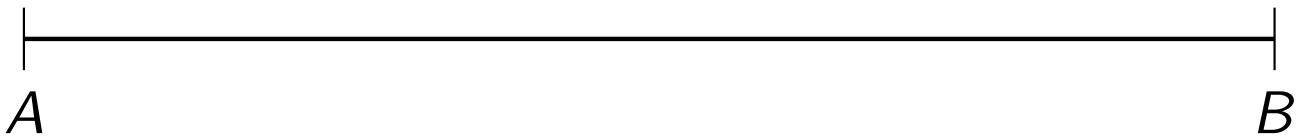
Motion Perception

What is motion?

Motion Perception

Zeno's Paradoxes

The Dichotomy paradox:



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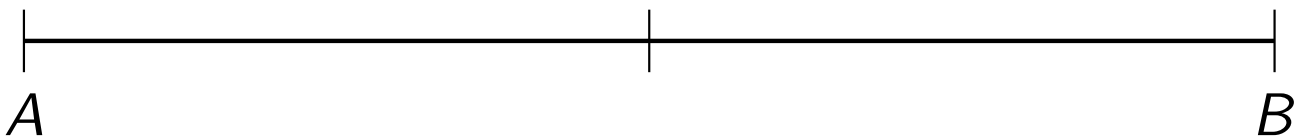

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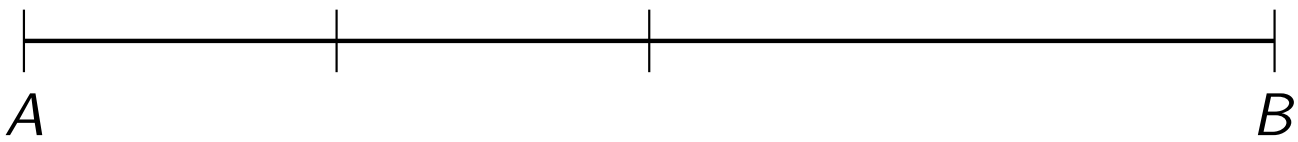

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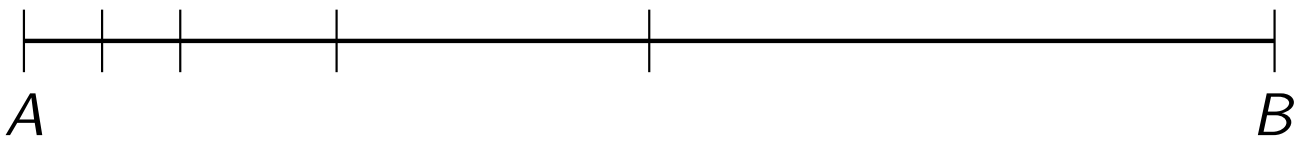

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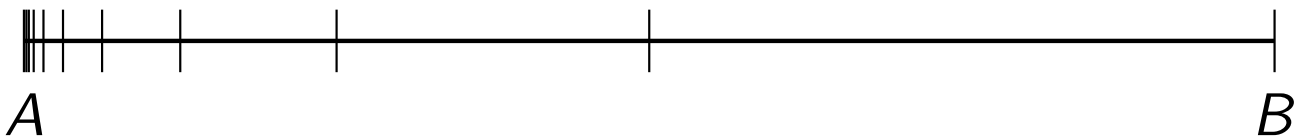

- What is the size of the first step?

Motion Perception

Zeno's Paradoxes

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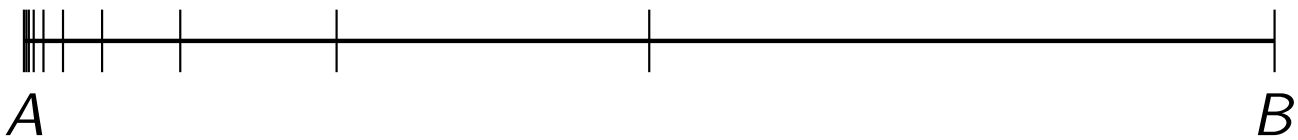
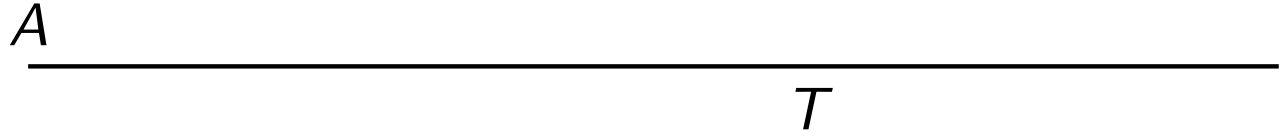


- What is the size of the first step?
- Motion requires completion of an infinite process.

Motion Perception

Zeno's Paradoxes

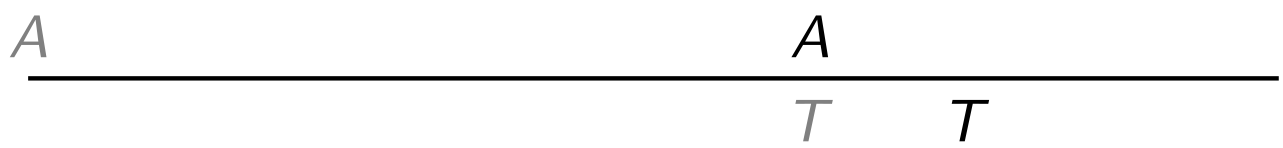
Achilles and the Tortoise:



Motion Perception

Zeno's Paradoxes

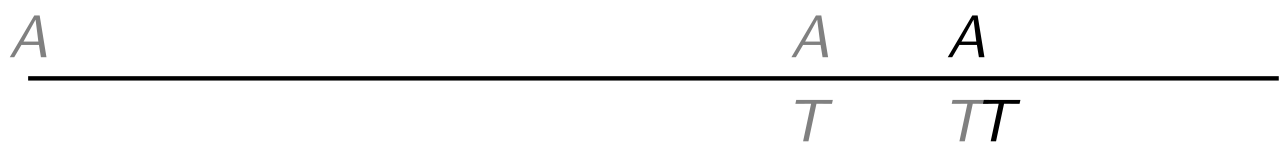
Achilles and the Tortoise:



Motion Perception

Zeno's Paradoxes

Achilles and the Tortoise:

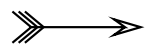


- Achilles must go through an infinite number of points before reaching the tortoise.

Motion Perception

Zeno's Paradoxes

The Arrow paradox:



- Where is motion in an instant of time?

Motion Perception

Persistence of Vision

Persistence of vision has two distinct meanings:

- continued response of the visual system to a stimulus that is no longer there:
  - (*e.g.* sparklers);
  - persistence of *visual response*.

Motion Perception

Persistence of Vision

Persistence of vision has two distinct meanings:

- continued response of the visual system to a stimulus that is no longer there:
  - (*e.g.* sparklers);
  - persistence of *visual response*.
- visual processing giving the perception of motion from a sequence of still images.
  - (*e.g.* cinemas);
  - persistence of visual response plays only a small part in this 'persistence of vision'.

Note: the eye is an inherently *analogue* system: it is not a camera, and normally there is no "sequence of still images".

Motion Perception

Projector and Display Design

Two distinct rates to consider in projector design:

- Frame rate: rate needed for the perception of smooth motion.
  - minimum: about 16Hz;
  - typically used: 24Hz.

Motion Perception

Projector and Display Design

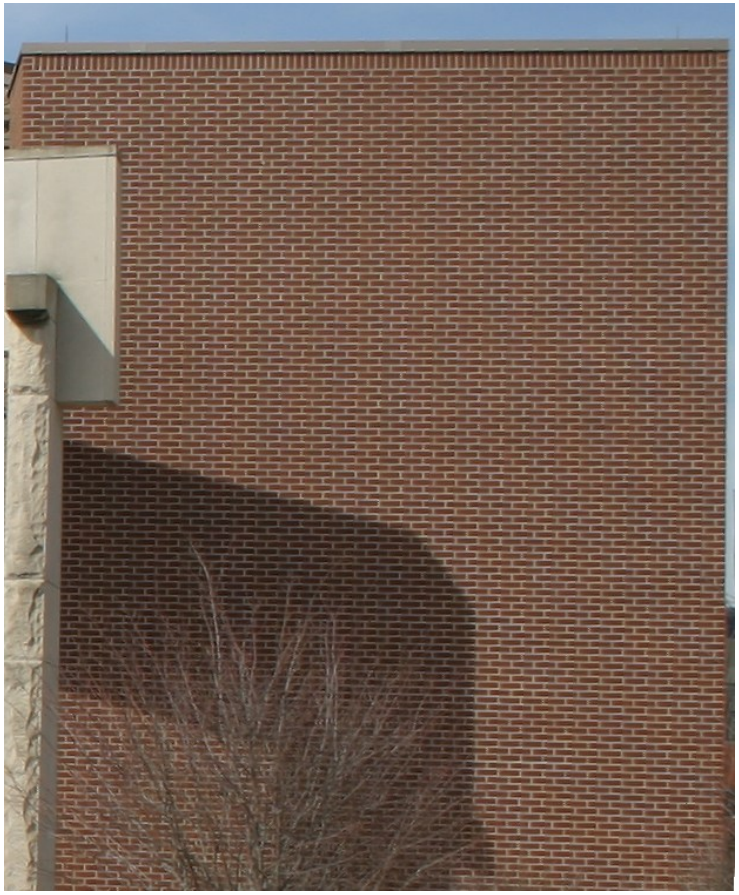
Two distinct rates to consider in projector design:

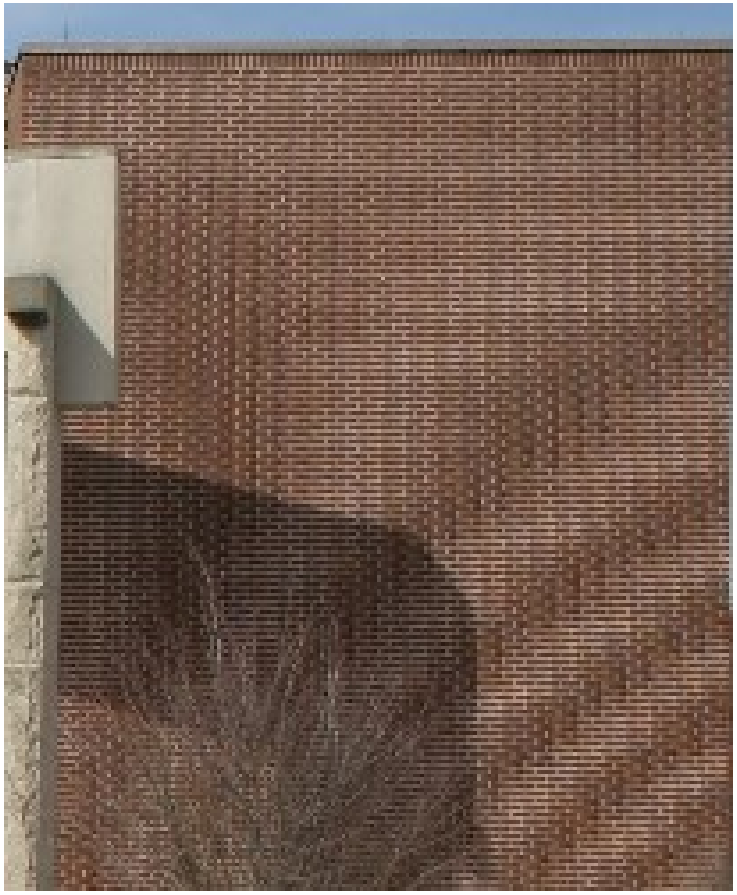
- Frame rate: rate needed for the perception of smooth motion.
  - minimum: about 16Hz;
  - typically used: 24Hz.
- Flicker rate: rate needed to avoid the sensation of interruption.
  - must be at least the frame rate;
  - often double or triple.

Note: different frame / flicker rates in one system can lead to **aliasing**.

Motion Perception

Aliasing





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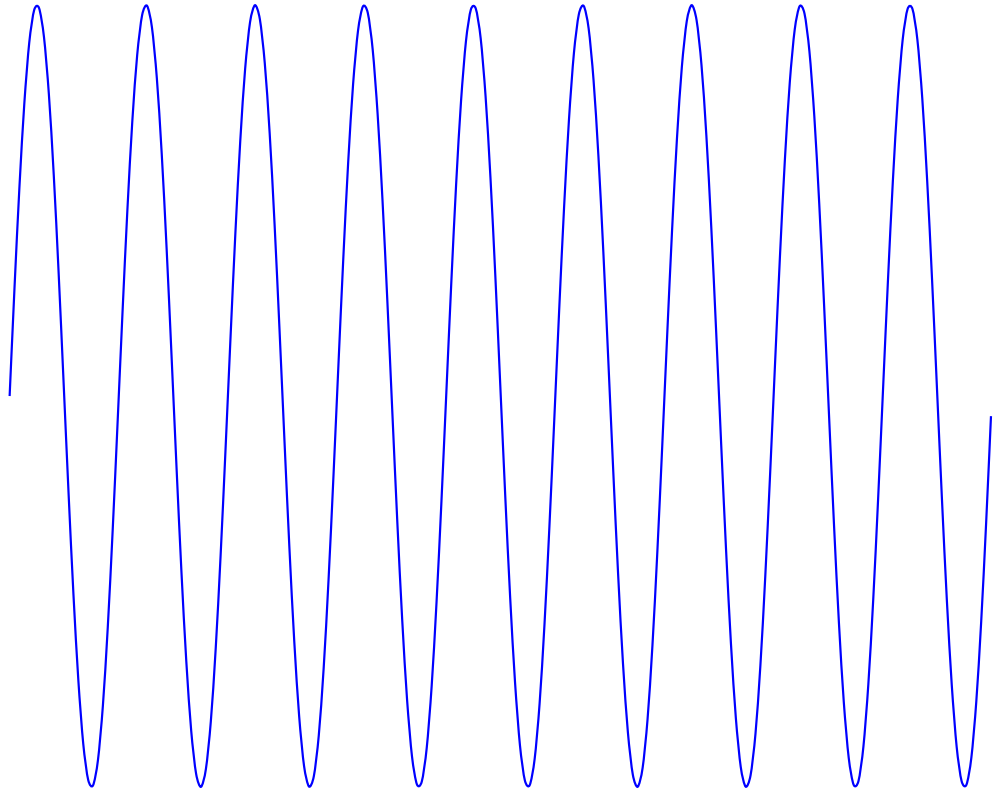
Motion Perception

Aliasing



Motion Perception

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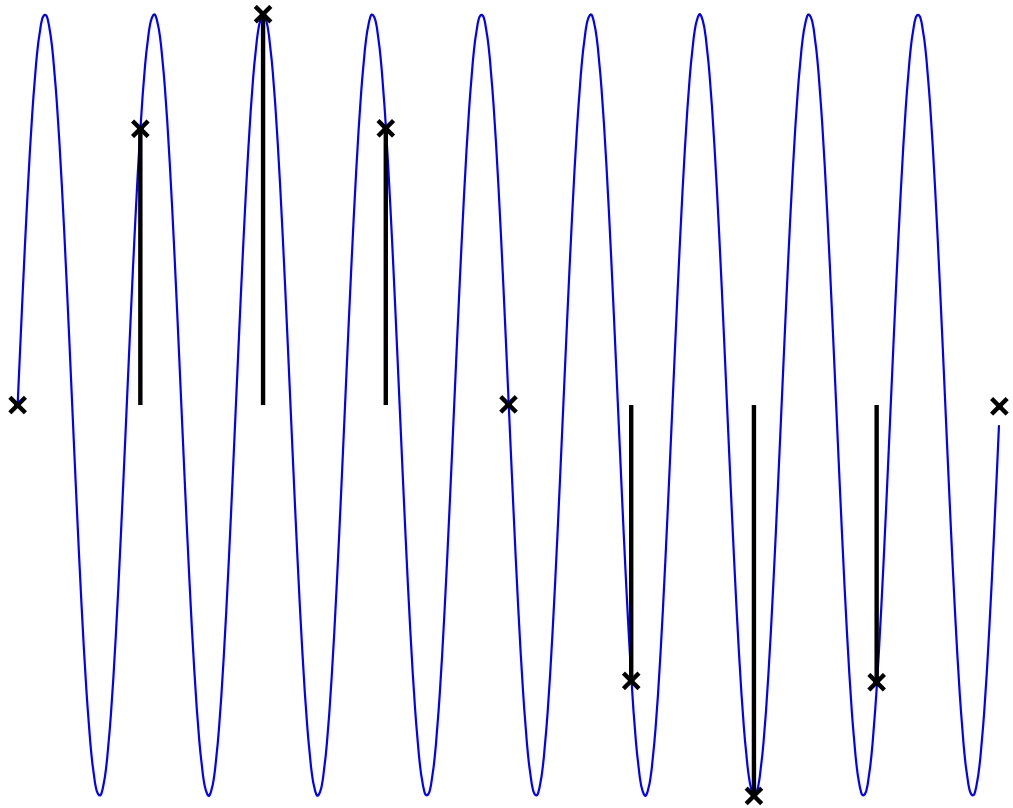

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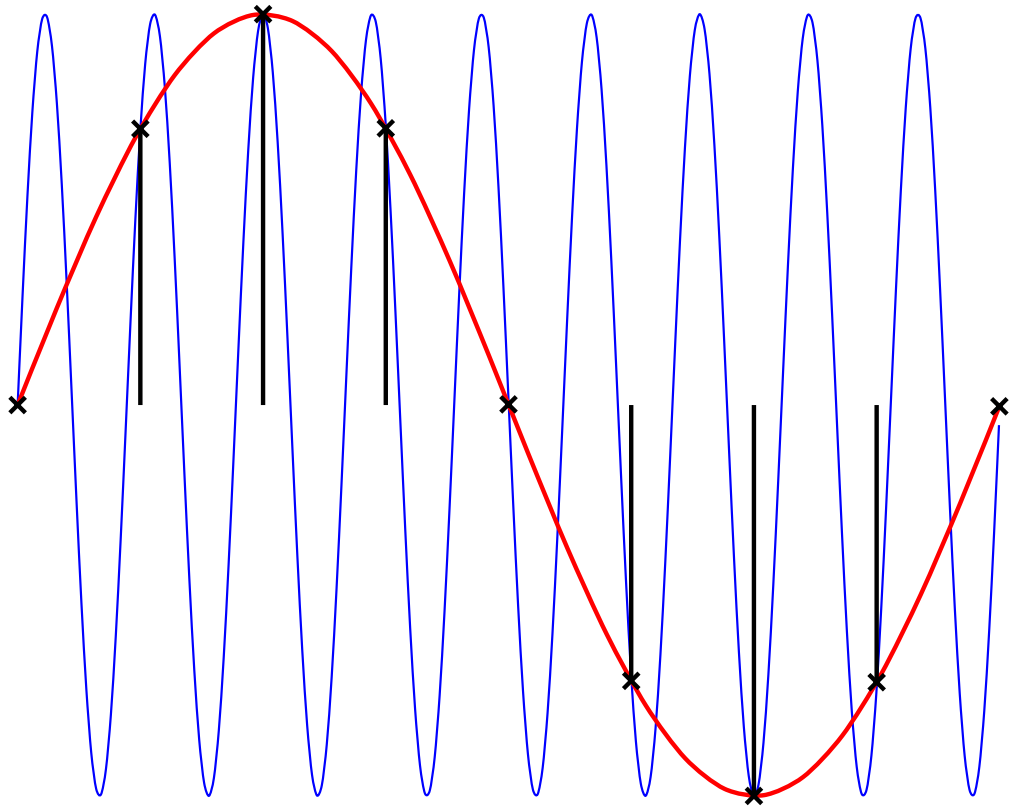

Motion Illusions

Beta Motion and the Phi Phenomenon

Wikimedia Commons (user Pataki Márta)
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Max Wertheimer (1880–1943)

Motion Illusions

Beta Motion and the Phi Phenomenon

Beta motion:

- probably responsible for motion interpretation of sequences of stills.

Motion Illusions

Beta Motion and the Phi Phenomenon

Beta motion:

- probably responsible for motion interpretation of sequences of stills.

Phi Phenomenon:

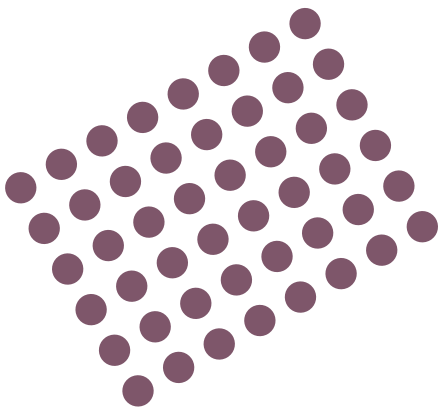
- 'objectless' motion;
- discovered by Wertheimer in 1912;
- kickstarted the Gestalt revolution.

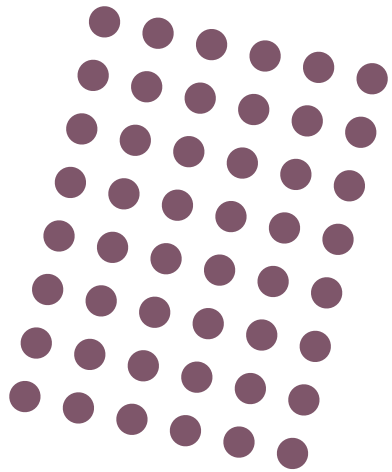
Gestalt Principles

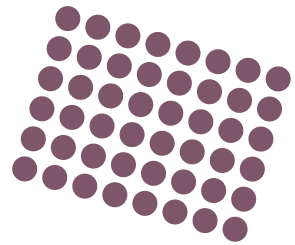
- Proximity;
- Closure;
- Similarity;
- Continuity;
- Common Fate.

Gestalt Principles

Proximity

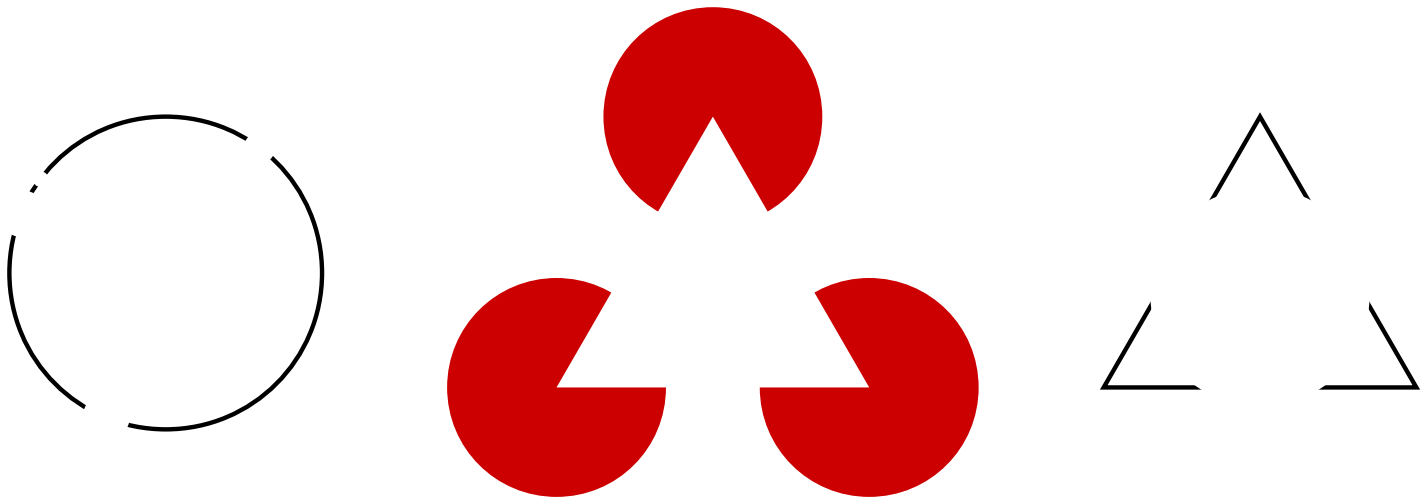






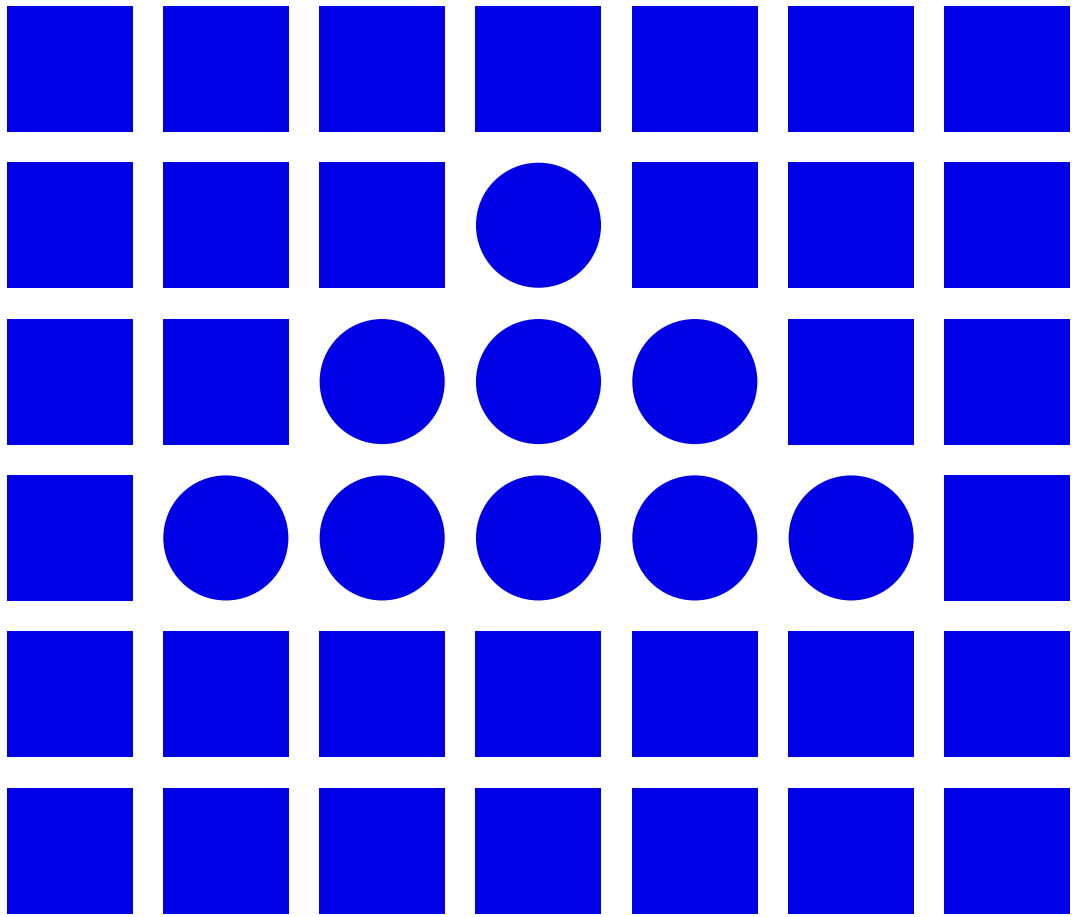
Gestalt Principles

Closure



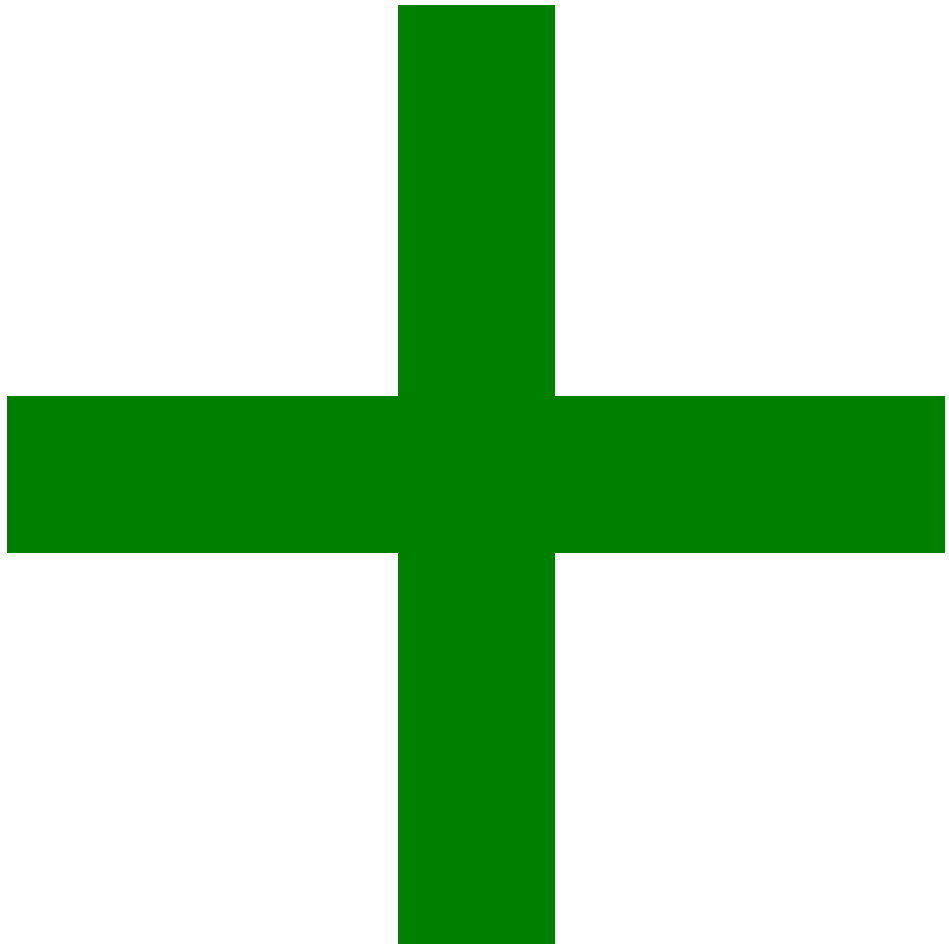
Gestalt Principles

Similarity



Gestalt Principles

Continuity



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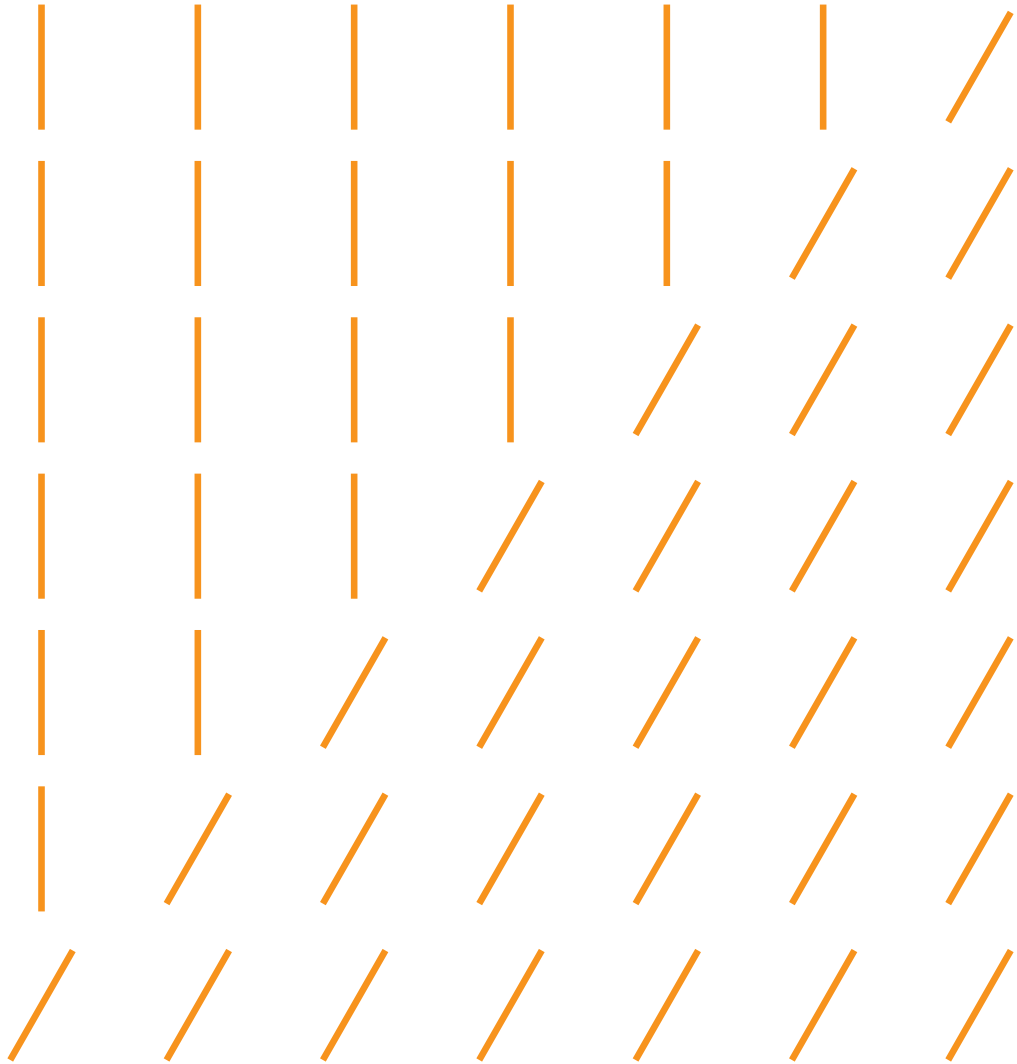
Common Fate