

Creative Computing II

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Autumn 2009, Tuesdays, 10:00–15:00
Winter 2010, tbc

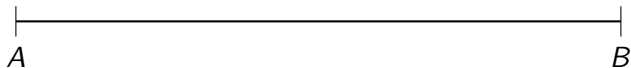
Motion Perception

What is motion?

Motion Perception

Zeno's Paradoxes

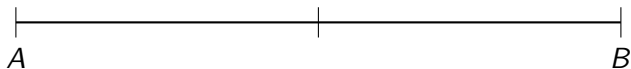
The Dichotomy paradox:



Motion Perception

Zeno's Paradoxes

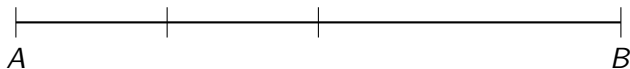
The Dichotomy paradox:



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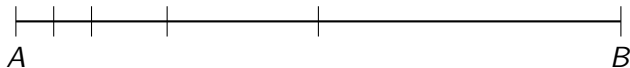
The Dichotomy paradox:



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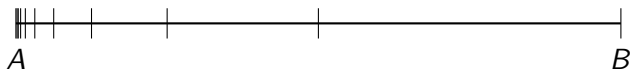
The Dichotomy paradox:



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The Dichotomy paradox:

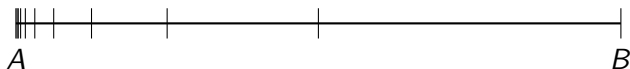


- ▶ What is the size of the first step?

Motion Perception

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The Dichotomy paradox:

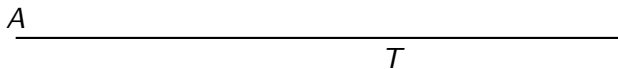


- ▶ What is the size of the first step?
- ▶ Motion requires completion of an infinite process.

Motion Perception

Zeno's Paradoxes

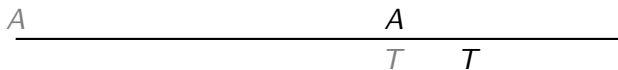
Achilles and the Tortoise:



Motion Perception

Zeno's Paradoxes

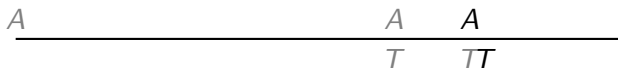
Achilles and the Tortoise:



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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 Illusions

Beta Motion and the Phi Phenomenon

[commons-licenced picture not found]

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:

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Phi Phenomenon:

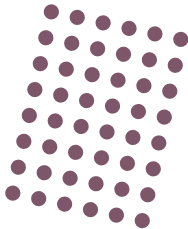
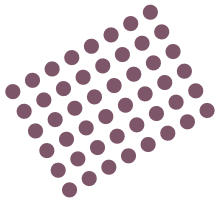
- ▶ 'objectless' motion;
- ▶ discovered by Wertheimer in 1912;
- ▶ kickstarted the Gestalt revolution.

Gestalt Principles

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

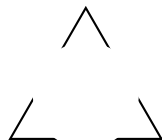
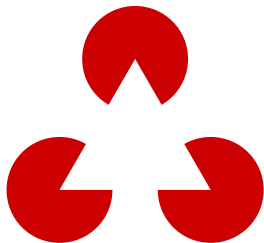
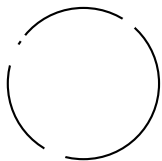
Gestalt Principles

Proximity



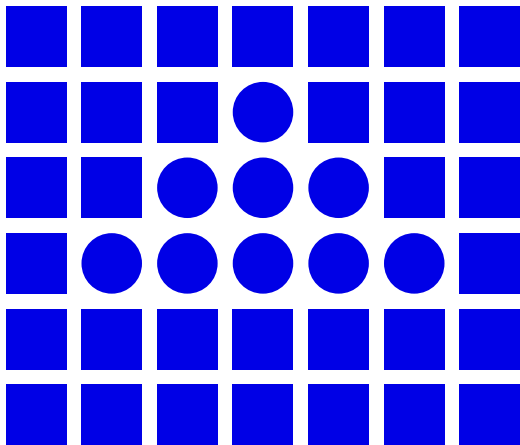
Gestalt Principles

Closure



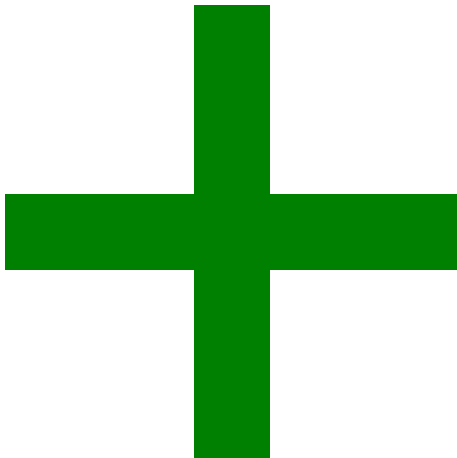
Gestalt Principles

Similarity



Gestalt Principles

Continuity



Gestalt Principles

Common Fate

