

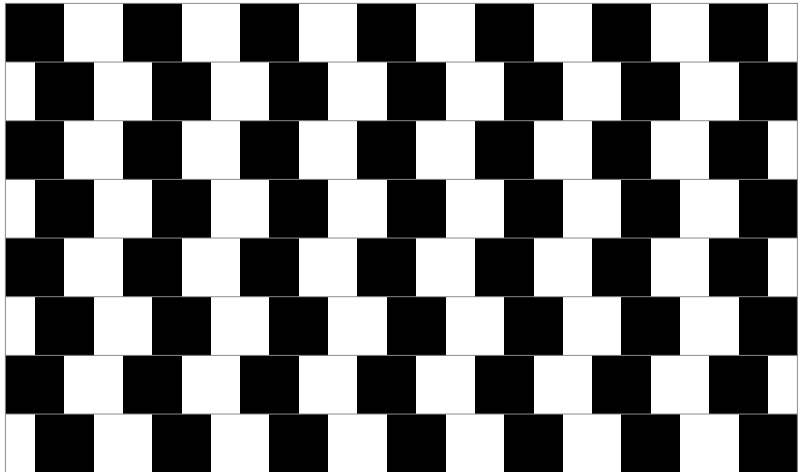
Statistics 120

Perception I

Visual Processing And The Brain

- When an image is passed to the brain it is processed through increasingly complex steps until it reaches the higher areas of the brain.
- Very little is known about the detail of these processing steps, but some intriguing information comes from *visual illusions*.
- Illusions appear to to be a result of the brain deriving incorrect information about what is being viewed.
- In more interesting illusions, the brain derives conflicting information about the scene being viewed.

The Cafe Wall Illusion



The Cafe Wall Illusion

- The lines in the image are either horizontal or vertical.
- The illusion stems from the fact that part of our visual processing system tells us that the lines must be sloping while the cognitive part of our brains tells us they are not.
- This illusion was first noticed by a perceptual psychologist strolling past a group of workmen tiling the wall of a cafe in Bristol, UK.

The (Real) Cafe Wall Illusion



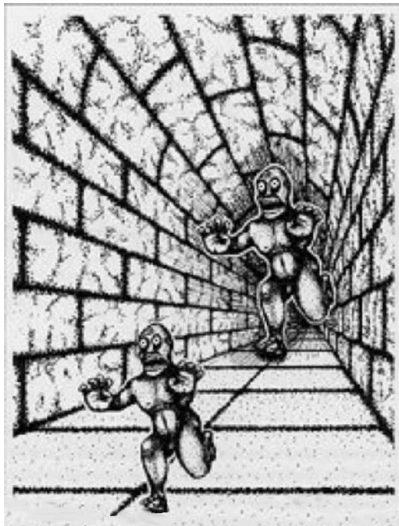
Types of Illusion

- Illusions come in a variety of forms.
- Geometric illusions are among the most interesting. Such illusions include:
 - distortions of lengths
 - distortions of angles
 - distortions of areas
 - distortions shapes

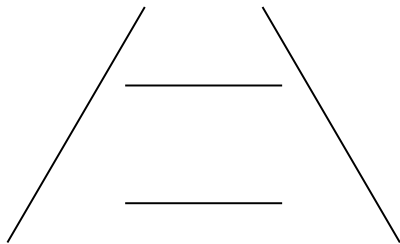
Perspective Illusions

- A number of illusions result from the visual system interpreting visual elements as giving information about depth.
- Perspective gives us very strong depth cues.
- Misinterpreting geometric features as resulting from perspective produces strong distortions.

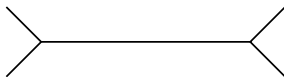
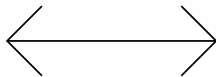
A Perspective Illusion



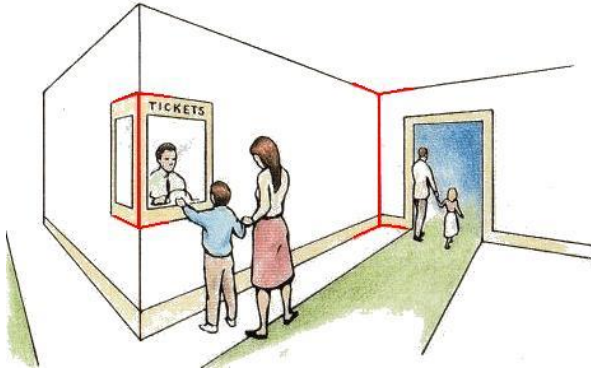
The Ponzo Illusion



The Müller-Lyer Illusion



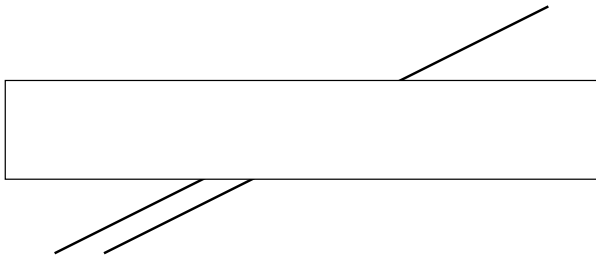
A Possible Source Of The Müller-Lyer Illusion



Angle Distortion Illusions

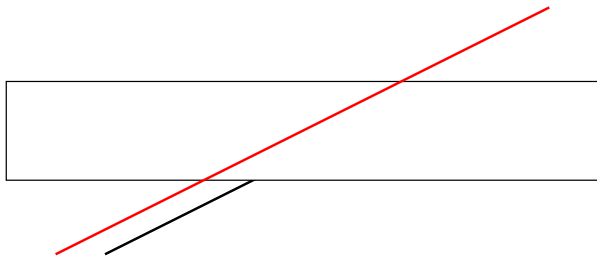
- The next group of illusions shown how angles can be misperceived by our visual systems.
- This is of some interest in presentation graphics.

The Poggendorf Illusion



Which of the two lower lines
is the extension of the upper line?

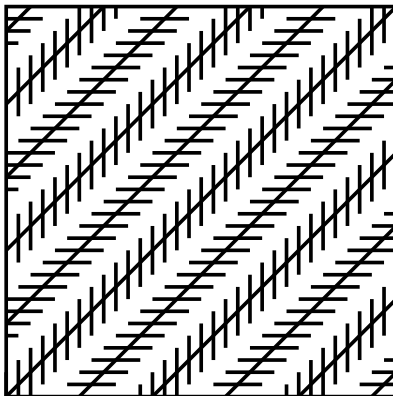
The Poggendorf Illusion



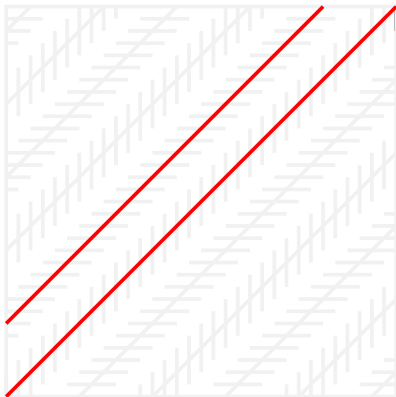
Explanation

- It appears that we have a tendency to overestimate the size of acute angles and to underestimate the size of obtuse ones.
- This effect is shown in the one of the Yarbus experiments shown in the last lecture.
- A variety of illusions result from this misjudgement.

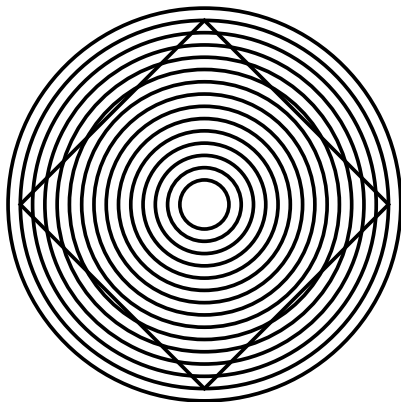
The Zöllner Illusion



The Zöllner Illusion



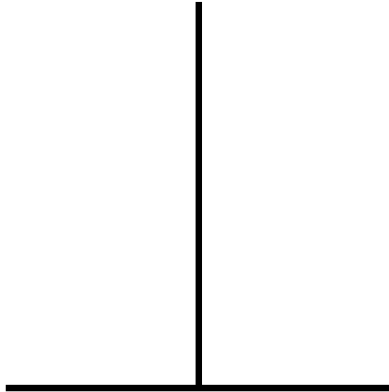
The Ehrenstein Illusion



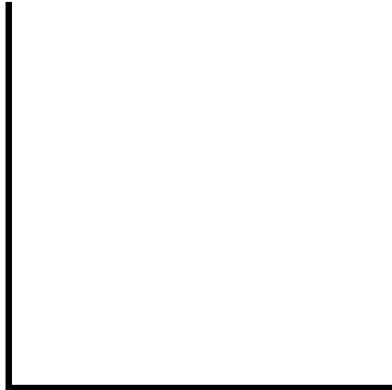
Size Illusions

- Perspective cues can lead us to misjudge the size of objects.
- This is not the only way in which we can be misled about the sizes.
- There are a number of size illusions which happen in purely two-dimensional diagrams.

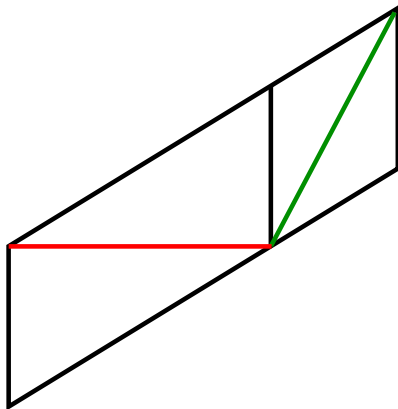
The Horizontal-Vertical Illusion



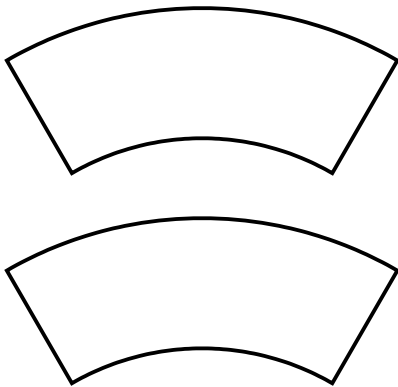
The Horizontal-Vertical Illusion



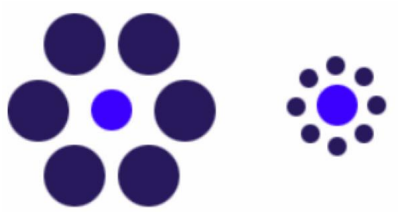
A Line Length Illusion



The Jastrow Illusion



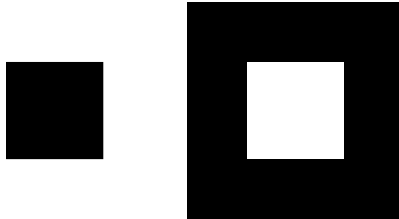
Tichener Illusion



Colour Illusions

- There are many illusions related to colour.
- Many of these are due to the fact that we do not see colour in isolation, but relative to its surrounding colour.
- Often this can be explained as a result of lateral inhibition.

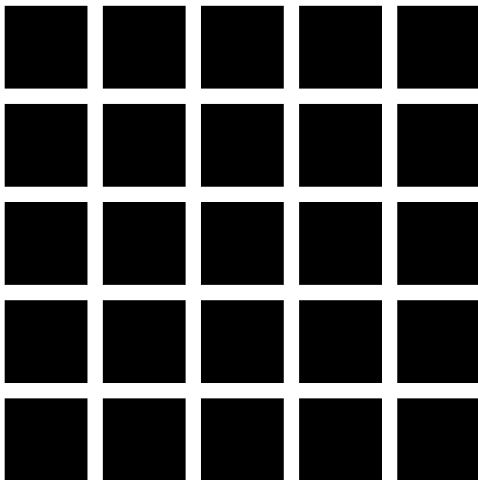
An Irradiation Illusion



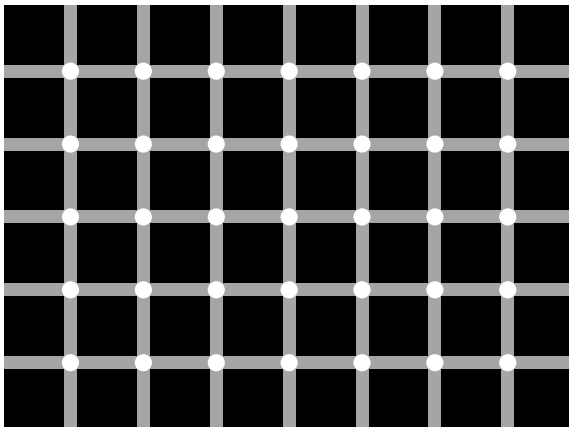
Mach Banding



The Hermann Grid



The Hermann Grid



Simultaneous Contrast



The appearance of colours depends on their surroundings.

Simultaneous Contrast



Simultaneous Contrast

