Models of Interaction Theory and HCI

People use computers to accomplish work

The system must support the user's task, which gives us a fourth focus

usability: if the system forces the user to adopt an unacceptable mode of work then it is not usable.

There are three ‘use’ words that must all be true for a product to be successful.

It must be:

Useful – accomplish what is required: play music, cook dinner, format a document;

Usable – do it easily and naturally, without danger of error, etc.;

Used – make people want to use it, be attractive, engaging, fun, etc.

Foundations of HCI

The Human (1)

- Humans are limited in their capacity to process information. This has important implications for design.
- Information is received and responses given via a number of input and output channels:

– visual channel

– auditory channel

– haptic channel

– movement.

The Human(2)

- Information is stored in memory:
  - Sensory memory
  - Short-term (working) memory
  - Long-term memory

- Information is processed and applied:
  - Reasoning
  - Problem solving
  - Skill acquisition
  - Error.

The Human (3)

- Emotion influences human capabilities.
- Users share common capabilities but are individuals with differences, which should not be ignored.

INPUT–OUTPUT CHANNELS

- A person's interaction with the outside world occurs through information being received and sent [input and output].
- In an interaction with a computer the user receives information that is output by the computer and responds by providing input to the computer – the user's output becomes the computer's input and vice versa.
- The use of the terms input and output may lead to confusion so concentrate on the channels involved.
- A particular channel may have a primary role as input or output in the interaction, it is more than likely that it is also used in the other role.

Vision

- Human vision is a highly complex activity with a range of physical and perceptual limitations, yet it is the primary source of information for the average person.
- We can roughly divide visual perception into two stages:

➢ **The physical reception of the stimulus from the outside world, and**

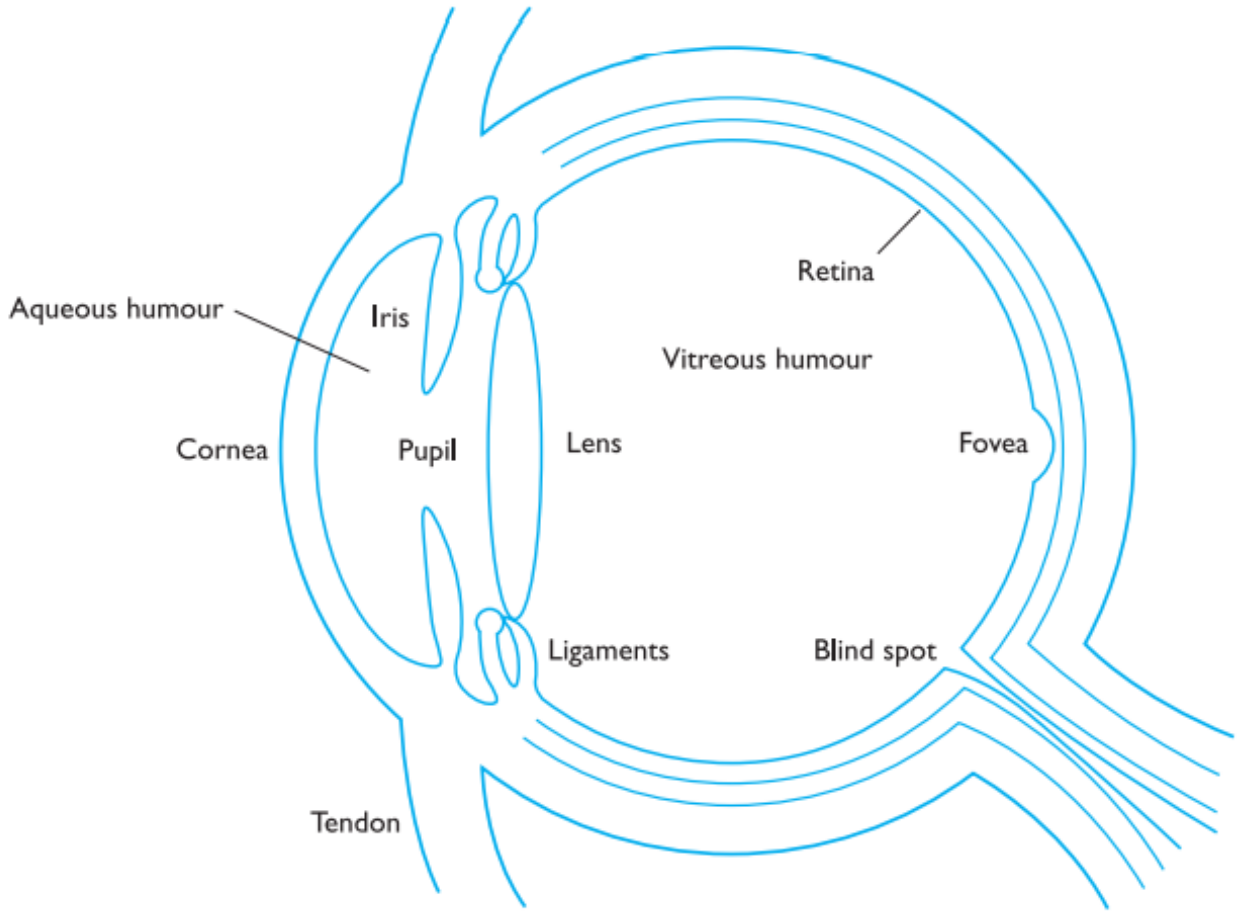
➢ **The processing and interpretation of that stimulus.**

We will begin by looking at the eye as a physical receptor, and then go on to consider the processing involved in basic vision.

The Human Eye

- Vision begins with light. The eye is a mechanism for receiving light and transforming it into electrical energy.
- Light is reflected from objects in the world and their image is focused upside down on the back of the eye.
- The receptors in the eye transform it into electrical signals which are passed to the brain.

- The cornea and lens at the front of the eye focus the light into a sharp image on the back of the eye, the retina.
- The retina is light sensitive and contains two types of photoreceptor: rods and cones.



Rods

- Rods are highly sensitive to light and therefore allow us to see under a low level of illumination. However, they are unable to resolve fine detail and are subject to light saturation.
- This is the reason for the temporary blindness we get when moving from a darkened room into sunlight: the rods have been active and are saturated by the sudden light. The cones do not operate either as they are suppressed by the rods.
- There are approximately 120 million rods per eye which are mainly situated towards the edges of the retina.
- Rods therefore dominate peripheral vision.

Cones

- Cones are the second type of receptor in the eye. They are less sensitive to light than the rods and can therefore tolerate more light.
- There are three types of cone, each sensitive to a different wavelength of light. This allows color vision. The eye has approximately 6 million cones, mainly concentrated on the fovea, a small area of the retina on which images are fixated.
- Although the retina is mainly covered with photoreceptors there is one blind spot where the optic nerve enters the eye. The blind spot has no rods or cones, yet our visual system compensates for this so that in normal circumstances we are unaware of it.

Retina

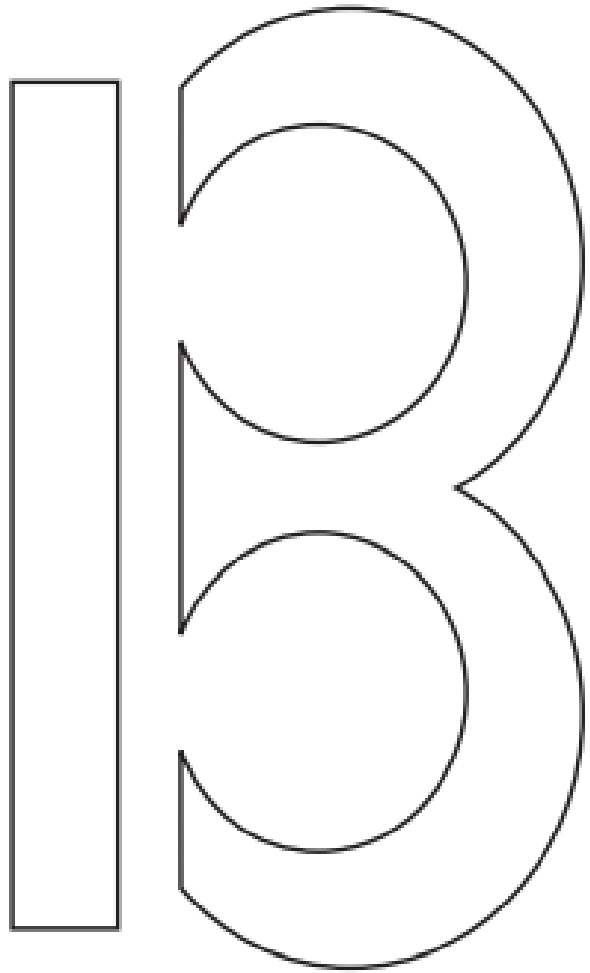
The retina also has specialized nerve cells called **ganglion cells**. There are two types:

X-cells, which are concentrated in the fovea and are responsible for the early detection of pattern

Y-cells which are more widely distributed in the retina and are responsible for the early detection of movement.

The distribution of these cells means that, while we may not be able to detect changes in pattern in peripheral vision, we can perceive movement.

Visual Perception Excercise




ABC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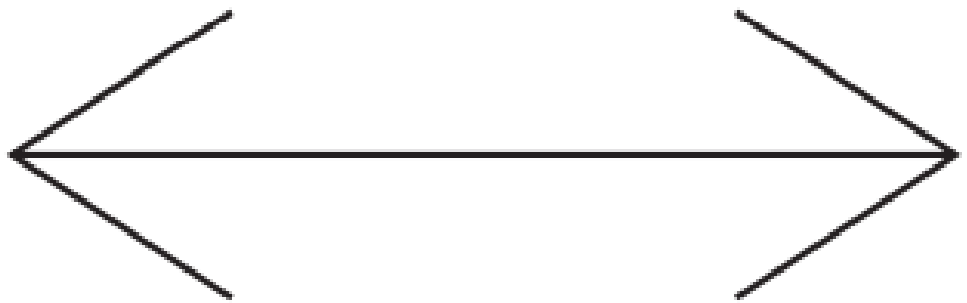
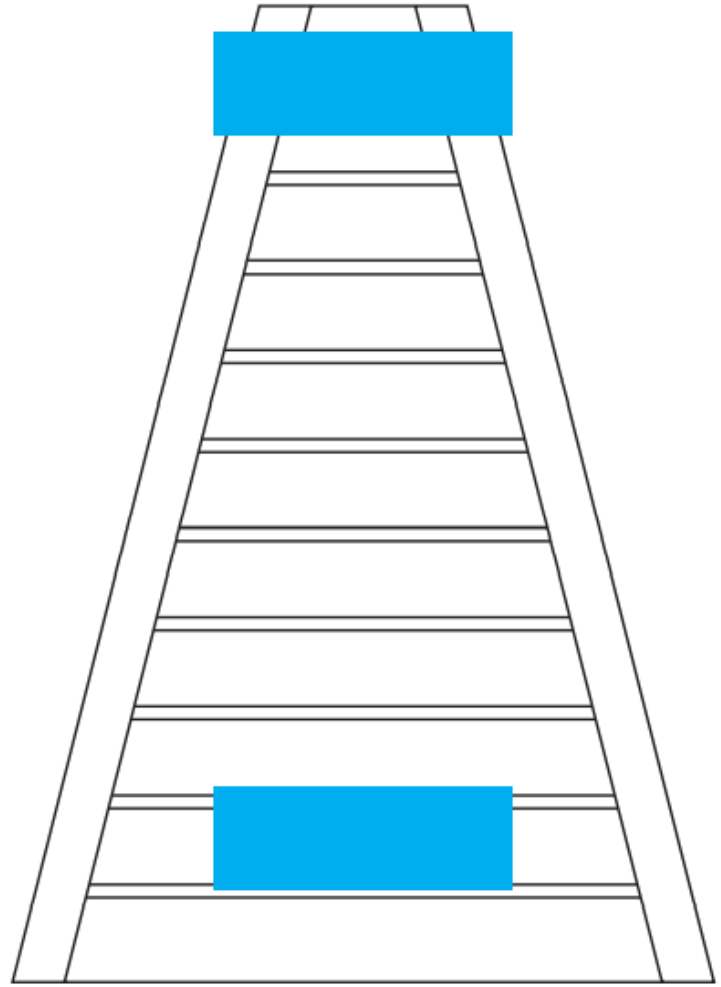
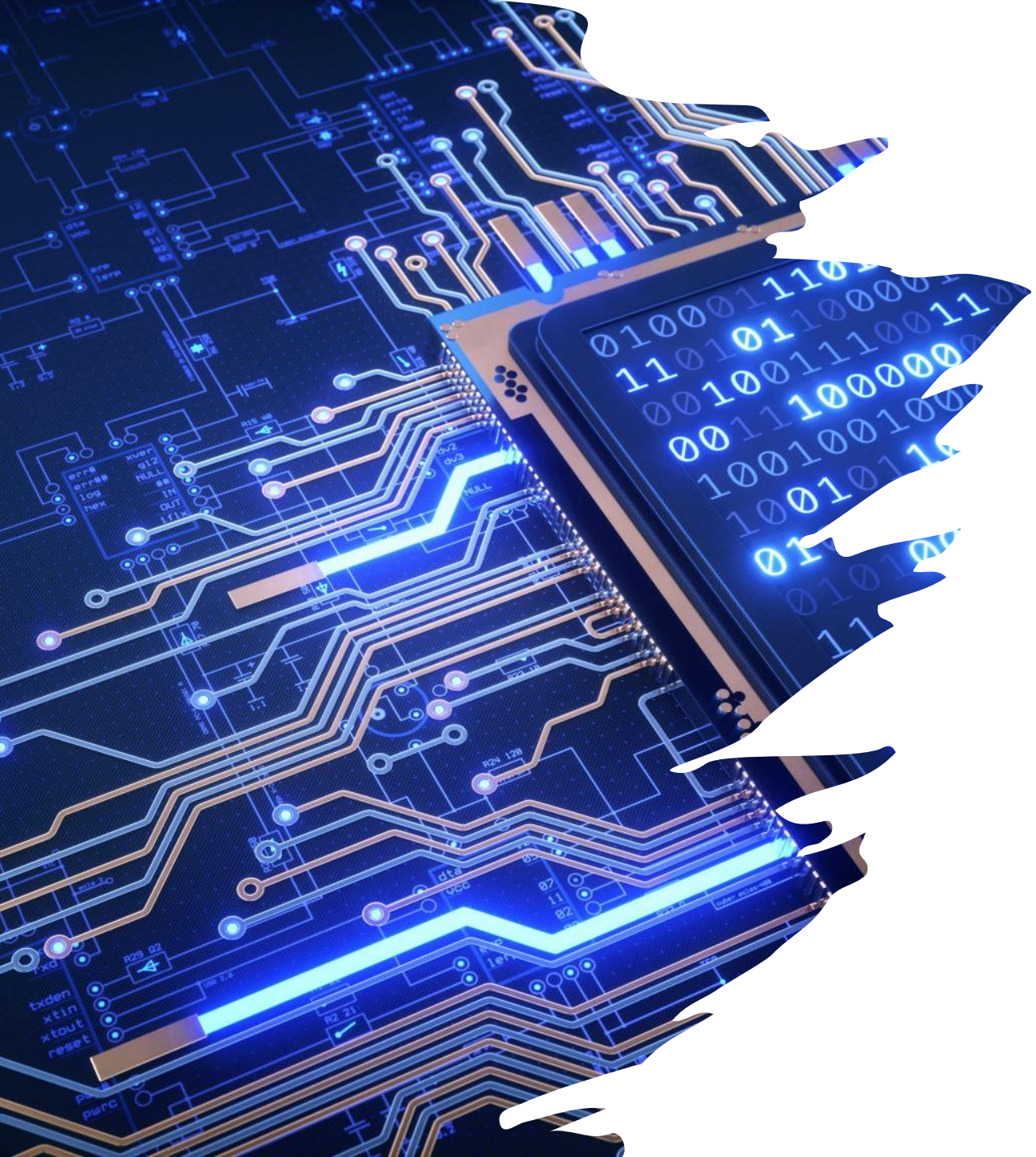




The quick brown fox jumps over the the lazy dog.



- The capabilities and limitations of visual processing