What a driver sees and understands affects road safety

WHAT A DRIVER ACTUALLY SEES

There are considerable limitations to what a driver is able to notice and safely respond to.

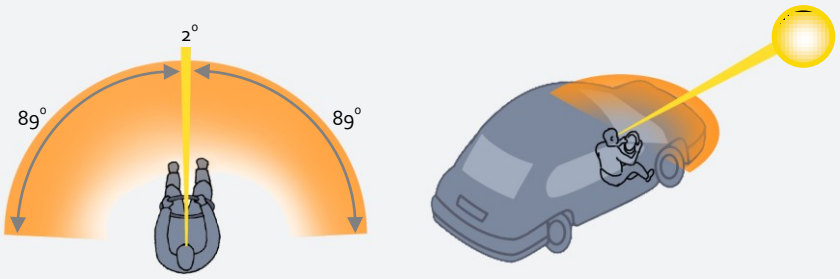
Our eyes only have the ability to analyse in detail central vision: a very small part of our total vision. We take in a wider view through a series of brief fixations, linked by eye movements.

We can choose to move our eyes to a new location in the scene, where we believe it profitable to look. But an involuntary change of fixation can be caused by a potentially important change in the scene. Therefore a driver can only analyse a limited amount of information.

In low light conditions, central vision is more affected than peripheral vision.

The eye only sees a narrow two degree cone of central vision in sharp focus

A total scene is understood through a series of eye movements to very specific points



The rest is seen partially and out of focus, as a blur, though movement can be detected across 180 degrees.

This peripheral vision is used for vehicle guidance, and so a driver is able to navigate at high speed but may fail to detect hazards, or signs.

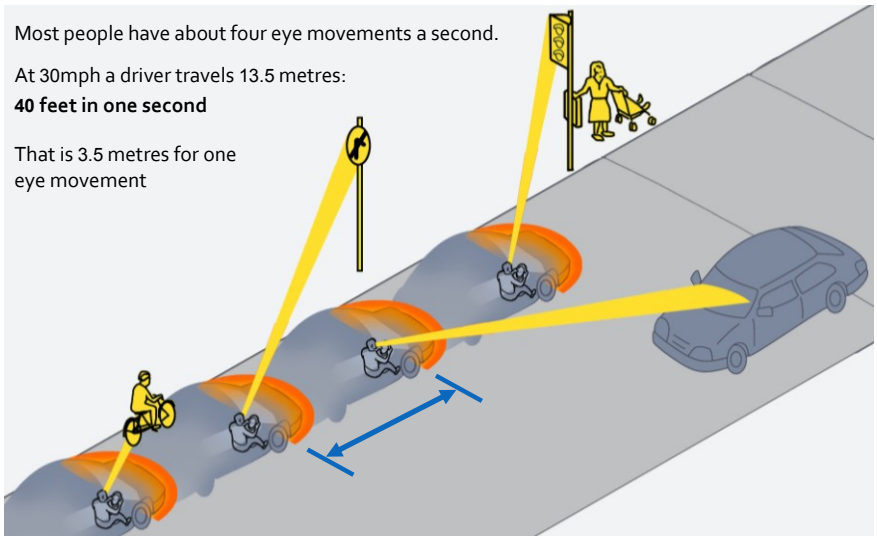
PERCEPTION

Visual perception is the result of the brain processing information from the eyes, and combining it with knowledge and experience.

It is a highly interpretive process, designed for the extraction and enhancement of those features in the environment which are important for survival. It evolved to function at the speed at which we were able to move around on foot. It is not surprising that errors occur when the same system is required to function while both travelling well above running speed and while conducting the complex task of driving.

As speed increases, we are forced to attend to the scene around us more selectively and rely, in part, on our expectations as to what will be present and where. We may simply not see what is unexpected.

The brain tries to understand a complete scene through a series of selected eye movements



It is difficult for drivers to watch the road and at the same time read complex traffic signs

CONSPICUITY

Conspicuity is defined as those characteristics of an object or condition that determine the likelihood that it will come to the attention of the observer. There are two types of conspicuity, sensory conspicuity and cognitive conspicuity.

Sensory conspicuity refers to the capacity of an object to be detected when an observer is not specifically looking for it. Important factors are: size, the object's contrast to its surroundings, its positioning within the observer's field of view, and motion.

Cognitive conspicuity relates to the capacity of an object to be detected if an observer is specifically looking for it. It is dependent on the information contained by the object and the psychological state of the observer.

High visibility clothes help cyclists be seen, but only if drivers are also looking for them

A regulatory sign may have high sensory conspicuity, but for a driver who knows the route, the information it contains is irrelevant. It therefore has little cognitive conspicuity and so may not be noticed at all

Because drivers need to be selective in what they look for, they may look but not see