

Series (27):

Optical mixing

The term 'optical mixing' stems from the science or theory of colours and refers to the way our vision can produce the illusion of a third colour when dots, lines or objects of two different colours are placed close together. Since we are not talking objectively about a real surface, the process of optical mixing is described as a phenomenon.

Optical mixing is the perceptual phenomenon that is most obviously based on the limitations of the human eye – to be more exact, the eye's limited power of resolution.

When it comes to the proportions of perceivable objects, the powers of human perception are quite clearly limited. This is irrespective of the extent of rods and cones, and lies in the range of 60 lines per centimetre for people with normal eyesight when the page is at a normal distance from the reader. Should these dimensions change, be it through downsizing the objects or widening the distance between the objects and the eye, our visual system is no longer able to perceive an individual object. If there happen to be several objects within the field of vision, then they merge into one. This does not only work with elements of different hues, but also in the case of monochromatic objects, or ones in different shades of grey only with black elements against a white background.

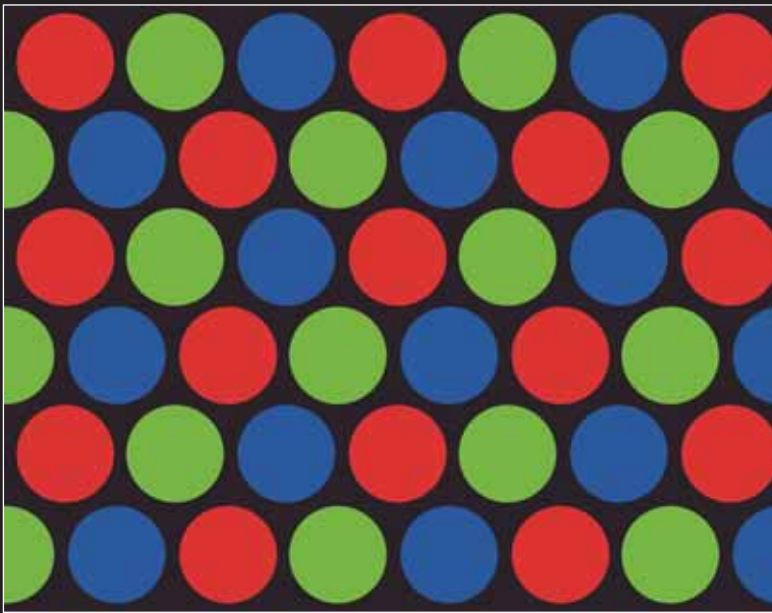
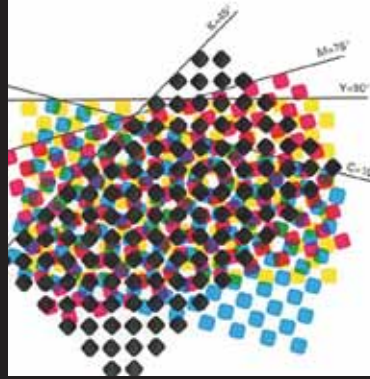
There are various ways optical mixing in this form can be applied. The first deliberate applications of the phenomenon were in the field of painting. Impressionism and pointillism play games with the observer and the distance he is from the work of art which is made up of seemingly random brush strokes or dots and is objectively hardly discernable close up. The points of colour coalesce, however, and create a recognizable image the further away the observer is standing.

We see optical mixing mostly today in screen printing. In the case of colour printing, it is applied in conjunction with subtractive colour mixing. Three colours (cyan, magenta, yellow) with black (key colour) added in



Pointillism: the works of art are made up of dots which have to be viewed from a certain distance for the observer to recognise the image.

Right: subtractive colour mixing.
(CMYK dots)
Below: additive colour mixing
(RGB dots)



the form of dots are applied on a white background, usually paper. In print media these dots are so small that they cannot be perceived as such at a normal reading distance. They are seen as surfaces, in different shades of grey or coloured.

In media screen and media facade technology optical mixing is used in combination with additive colour mixing (also known as RGB mixing). On TV screens and computer monitors the tiny dots of orange-red, violet-blue and green light on a black screen cannot be distinguished as such close up. On media walls generated using LED technology on the other hand the individual dots can be perceived well close up.

The demonstration of different coloured light pulses displayed in rapid, periodical sequence will, depending on the speed at which this takes place, also lead to the perception of homogeneous colour. The borderline is recorded as being at around 25 Hertz. This is also a manifestation of optical mixing, although often forgotten as such.