Difference of a colour contrast effect in 3-dimensional layout and 2-dimensional layout

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An effect of colour contrast is the phenomenon in which colour appearance of a chromatic field is changed by an existence of a surrounding chromatic field. This effect can be observed strongly in the simple stimulus in which a colour patch at a centre is surrounded by a larger colour patch. However, we do not feel such kind of chromatic shift on a coloured object in a natural environment. There are some possible reasons for this little colour contrast effect such as colour constancy, object-based colour memory, surface pattern of a material, 3-dimensional perception between the object and the background, and so on. This research investigates the influence of 3-dimensional layouts between a coloured object and a coloured background without a binocular disparity.

We asked an observer to match a colour of an object in a photo image presented on a LED screen to a colour square of 10 degree presented on a CRT. In the first condition, we used photo images in those the object was one of a book (purple), a CD-case (brown) or a soap case (orange) and was placed in front of a coloured wall. The colour of the wall was one of red, blue, yellow or green. In the second condition, we used the images in those the area of the object in images was painted by one homogeneous colour (processed by Adobe Photoshop), in order to eliminate influences by the object recognition and surface pattern. In the third condition, the area of the background wall was also painted by one homogeneous colour in order to make 2-dimensional layout. Colour of each matching point was measured by a luminance and color meter.

The difference of matching points in chromatic coordinates between different background wall colours indicates the amount of colour contrast effect. The result shows that the effect of colour contrast was substantially observed only in the third condition (2-dimensional layout) but not other conditions (all 3-dimensional layouts including real object presentation as a control). It indicates that the 2-dimensional layout is important for the colour contrast effect, and the 3-dimensional layout, even presented on the screen, disturbs the colour contrast effect.

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