3-D paintings on a flat canvas
Novel techniques developed by painters John Jupe and Dorle Wolf, and their significance for human stereopsis

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by simulating normal stereopsis, i.e., by offering double images which do not contain disparities with true stereopticon information. Double contours in the visual periphery thus make the 3-D information of the flatness of the canvas obsolete, and therefore the abundance of monocular depth cues like intersections, shading etc. can take over.

The presence of double contours seen with a single eye indicates that, in addition to the original retinal image, a visual affinity copy seems to be projected from the retina with its image details shifted towards the periphery.

What might be the purpose of such a visual affinity copy? In the retinotopic cortex projection the image is extremely distorted (Fig. 3a). As a consequence, the images sent from both eyes cannot be fused even when there is a flat surface (Fig. 3b). To determine tiny disparities in the peripheral visual field, it might be appropriate to project affinity copies to those sites of the cortex where the similarly distorted information from the other eye is available to arrive (5).

Our affinity copy hypothesis predicts that a punctiform luminous stimulus moved across the visual field may cause a double image in V1 when seen with a single eye. Single-cell excitations showing two subsequent peaks are indicative of such a double projection (D Perrett 2002, pers. comm.). If this should prove true, it might become necessary to reconsider the concept of Panum’s area (2) in the peripheral visual field.

Dorle Wolf (Würzburg) is the first painter who made use of enhanced “chromoestereopsis” (1) in art. When passing the blazed diffraction gratings of the colorless “ChromaDepth”-3-D glasses, light is dispersed according to the colors of the rainbow (3, 6-10). The different colors, from which white light is composed, thus enter the eye from different directions. As a consequence, colored surfaces stand out from the canvas, seem to hover in the air, become colored spatial objects which change before our eyes, for it is only gradually that there is an opening up of the full depth (5, 6, 9; Figs 4, 5).

When the lateral borders of homogeneously stained plain which adjoin areas of a different color indicate different positions-in-depth, they are generally perceived as skew, and so are plains containing continually gliding colors (Fig. 6). When reflecting several discrete wavelengths, an area may lead to the impression of several transparent plains being staggered in depth.

Most pigments reflect polychromatic light, thus contours may look blurred due to color dispersion. If the 3-D glasses are held a little off straight, so that one eye looks past the glasses, or if they contain only one diffusion grating filter, then the perceived depth is decreased by 75%, but the picture on the whole appears very sharp.

If the 3-D glasses are moved sideways until the left eye looks through the right “lens”, the colored surfaces seem to be arranged in reverse order: foreground and background are transposed.

As the angle of chromatic aberration of the ChromaDepth glasses is constant, perceived depth is seen to increase with the viewing distance - even more than is the case in normal 3-D projection.

Thus, the further you step back, the more sculptural the pictures seem, and as you pass by, the structures seem to turn, too.

Literatur:

Chromadepth 3-d glasses for enhancement of chromoestereopsis (Fig. 4-6)