The Perceived Depth from Disparity as Function of Luminance Contrast

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Abstract

Does human vision show the contrast invariance expected of an ideal stereoscopic system for computing depth from disparity? We used random dot stereograms to investigate the luminance contrast effect on perceived depth from disparity. The perceived depth of disparity corrugations was measured by adjusting the length of a horizontal line to match the perceived depth of the corrugations at various luminance contrasts. At each contrast, the perceived depth increased with disparity up to a critical value, decreasing with further increases in disparity. Both the maximum perceived depth and the disparity modulation level where this maximum occurred changed as a sigmoid function of luminance. These results show that perceived depth from disparity depends in a complex manner on the luminance contrast in the image, providing significant limitations on depth perception at low contrasts in a lawful manner, but one that is incompatible with existing models of cortical disparity processing.