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Brightness Assimilation in Bullseye Displays

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In simultaneous brightness contrast displays, a gray square surrounded by a black background appears brighter than an identical gray square G_W surrounded by a white background. Here we demonstrate that this effect is G_B reversed if the background of G_B alternates radially outward from black to white to black to white, while the background of G_W alternates radially outward from white to black to white to black. Under these circumstances, assimilation occurs: G_B appears darker than G_W, even though the immediate contexts of both G_B and G_W are identical in the bullseye and simultaneous contrast displays. An experiment was run to test how width of the surrounding bands and target luminance affects observers' perceptions. Assimilation effects occurred in all conditions. The effect of surround-band width was small but significant, while the effect of target luminance was significant and much stronger: across target Weber contrasts of -0.25, 0, and 0.25, assimilatory perceptions were maximal when target contrast was -0.25 and substantially decreased as target contrast increased. The assimilation effects found are not predicted by the threshold CSF model described in DeValois & DeValois[(1988), *Spatial Vision,* Oxford University Press], the anchoring model of Gilchrist *et al.* [(1999) *Psychological Review, 106(4),* 795-834], or Blakesless & McCourt's [(1999) *Vision Research, 39,* 4361-4377] ODOG model.