

## **Brightness perception: one simple model explains most if not all effects**

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Few models can explain Mach bands (Pessoa, 1996 *Vision Research* 36 3205-3227) . Our own employs multiscale line and edge coding by simple and complex cells. Lines are interpreted by Gaussian functions, edges by bipolar, Gaussian-truncated errorfunctions. Widths of these functions are coupled to the scales of the underlying cells and the amplitudes are determined by their responses. One lowpass filter is used for constructing a background brightness. This model explains Mach bands by the fact that simple cells cannot discriminate between ramp edges and lines, such that positive and negative lines are produced at ramp edges. Apart from Mach bands and attenuations by adjacent stimuli (Pessoa, 1996 *Perception* 24 425-442) , the model can explain grating induction, Chevreul steps, Craik-O'Brien-Cornsweet discs, opposite induction effects (simultaneous brightness contrast and assimilation) , including variations by Blakeslee et al (2005 *Vision Research* 45 607-615), and variations of Adelson's tile and snake illusions (Logvinenko and Ross, 2005 *Spatial Vision* 18 25-72) . Conclusion: brightness by and large is a straightforward, data-driven process.

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