

Multiresolution wavelet framework reproduces induction effects

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Induction effects have been classified depending on the interactions between central stimuli and surroundings. When the brightness of the stimuli shifts away from the surroundings it is called contrast induction and when it shifts towards its surroundings it is called brightness assimilation. There have been attempts to model these effects with different modeling frameworks such as multiresolution decompositions based on difference-of-Gaussians (DoG). However, these results are limited to some effects while others remain unaccounted for. Here, we present a wavelet-based multiresolution computational framework, which incorporates the observer's CSF function, the target's distance, and some known nonlinearities of the human visual system, and can reproduce assimilation and contrast effects as two particular cases of a more general unified formulation. Moreover, some previously accounted for effects (such as the White effect, Mach bands, Chevreul effect) are predicted alongside the Dungeon illusion, the Adelson - Logvinenko tile, and the Todorović effect. We compare the predictions of our method with existing psychophysical data. Other existing models (such as the ODOG model) are also considered.