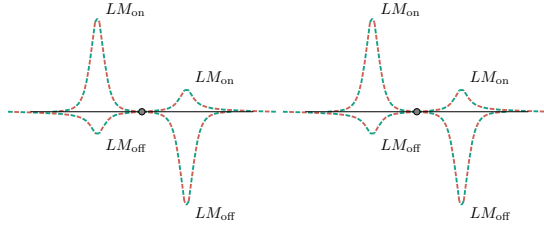
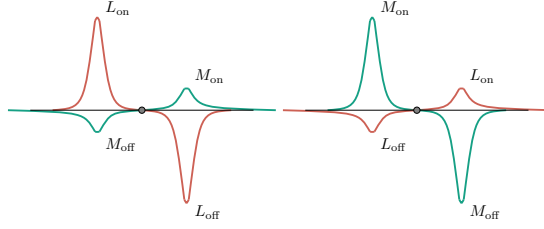


Figure 1: Diagram of *Opponent Processing of Receptive Fields* workflow. The L, M, and S channels are convolved with center and surround gaussians and then combined to build opponent colors, here exemplified by single-opponent cell receptive fields.



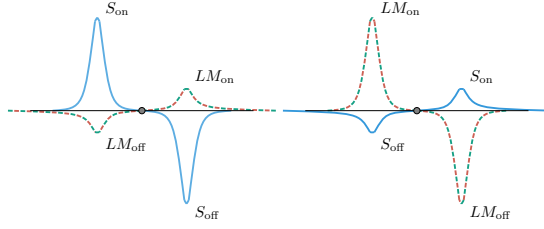
(a) Light DO
Receptive Field

(b) Dark DO
Receptive Field



(c) Red DO
Receptive Field

(d) Green DO
Receptive Field



(e) Blue DO
Receptive Field

(f) Yellow DO
Receptive Field

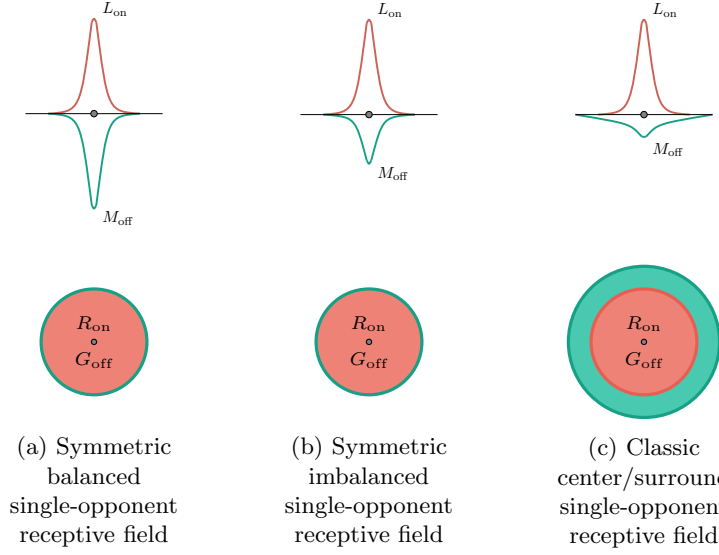


Figure 3: Examples of various possible single-opponent receptive field configurations, many others could be designed. All function to describe color properties of surfaces, though their response patterns to similar stimuli vary slightly.

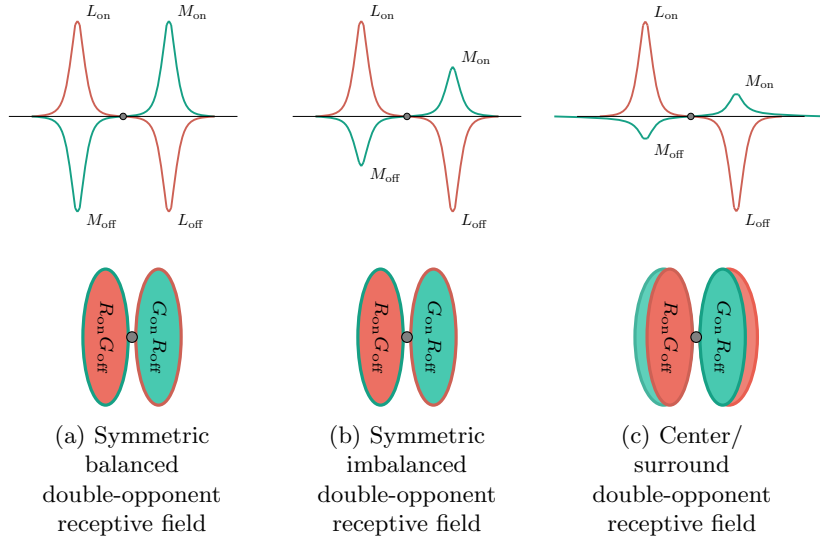


Figure 4: Examples of various possible double-opponent receptive field configurations, many others could be designed. All function to describe color properties of borders, though their response patterns to similar stimuli vary slightly.

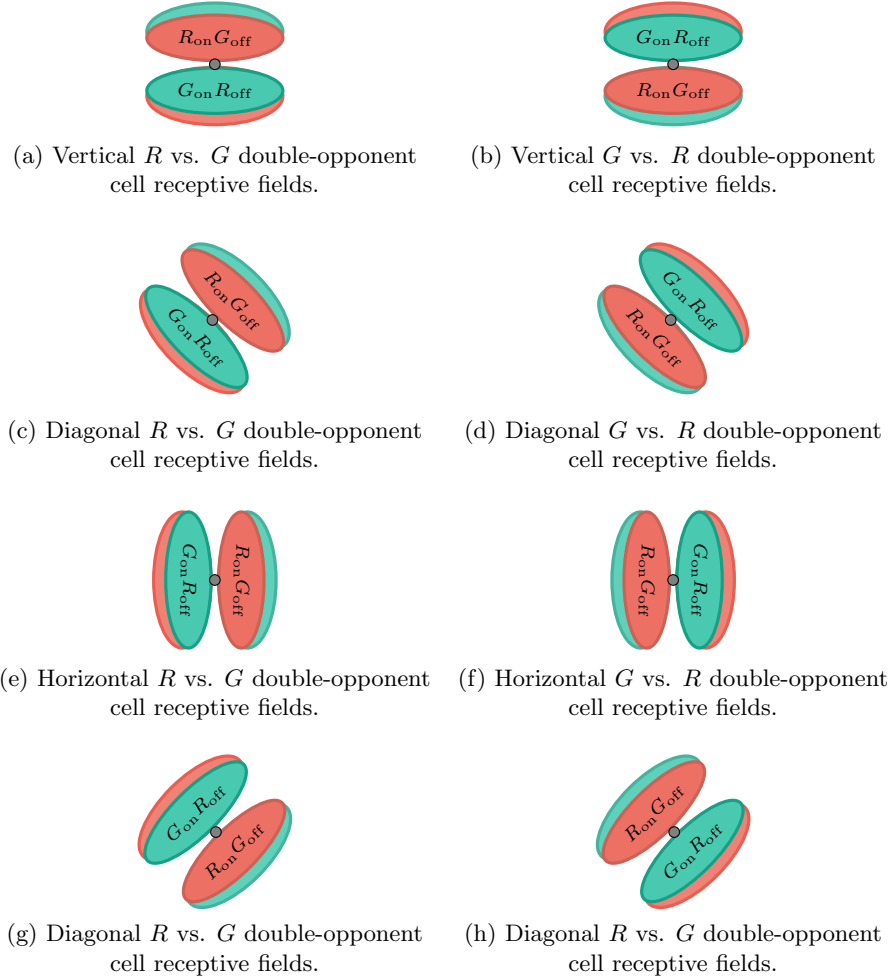


Figure 5: Schematic of orientation selectivity in double-opponent receptive field configurations. Any single double-opponent neuron only has one receptive field hard wired into it. By having collections of neurons, each selective to a different orientation at the same retinotopic location, we obtain a degree of rotation invariance.

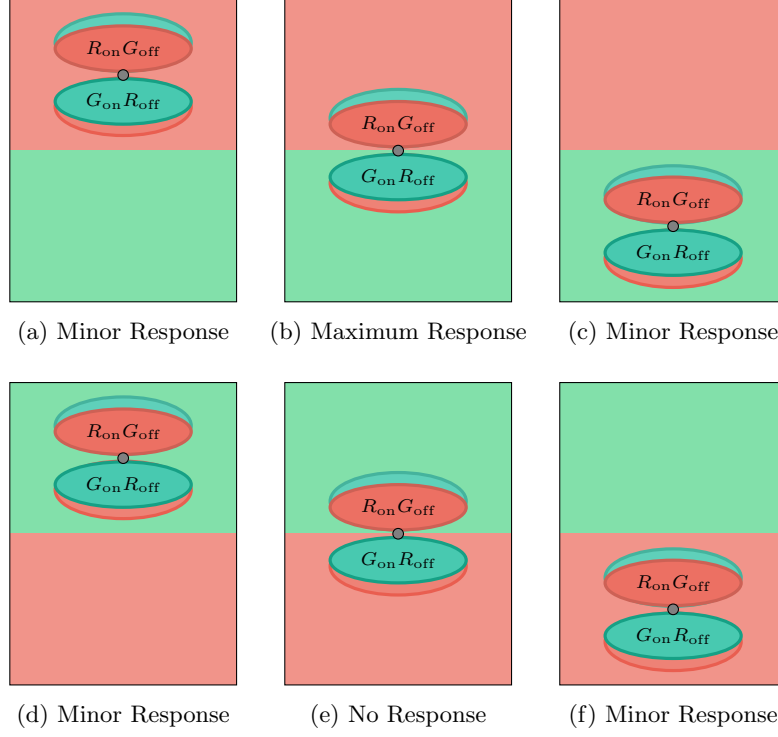


Figure 6: A double-opponent cell selective to horizontally oriented borders with red above and green below; only responsive to that particular stimulus. In Figure (b), the neuron is presented with its ideal stimulus: its L_{on} and M_{on} receptive fields are fully activated while its L_{off} and M_{off} receptive fields are completely unactivated. Figure (e) presents the neuron with the exact opposite stimulus, neither its L_{on} nor M_{on} receptive fields are activate at all, and both its L_{off} and M_{off} receptive fields are fully activated, ensuring no response possible from the cell. While its L_{on} receptive field might be strongly stimulated in (a) and (f), it's L_{off} receptive field cancels it out. Similarly, in (c) and (d) its M_{on} receptive field is stimulated but cancelled out by activity in its M_{off} receptive field.

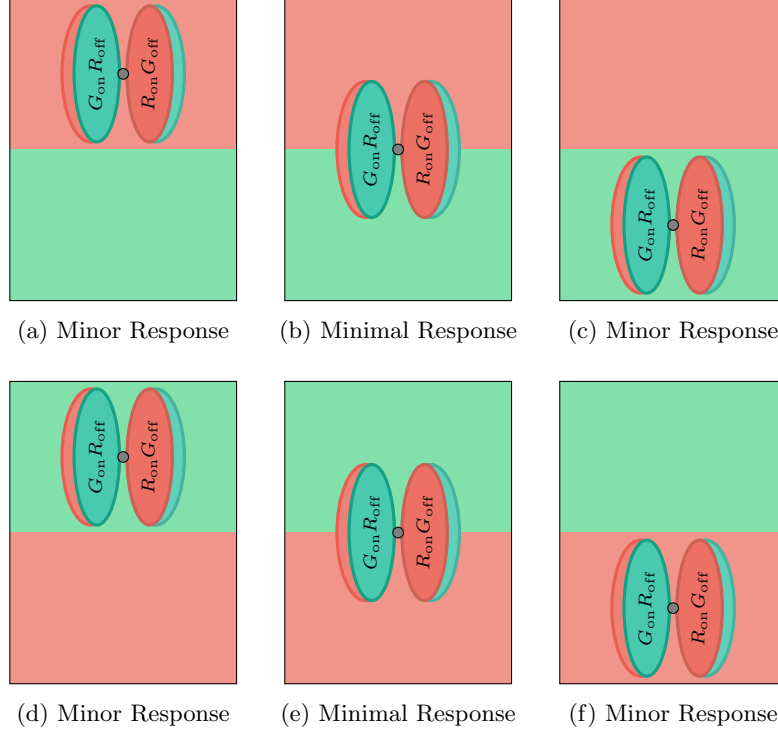


Figure 7: A double-opponent cell selective to vertically oriented borders with red to the right and green on the left; completely unresponsive to a horizontal border. While its L_{on} receptive field might be strongly stimulated in (a) and (f), its L_{off} receptive field cancels it out. Similarly, in (c) and (d) its M_{on} receptive field is stimulated but cancelled out by activity in its M_{off} receptive field. In (b) and (e) both of its L_{on} and M_{on} receptive fields are moderately activated, but again, cancelled out by activation in its L_{off} and M_{off} receptive fields, respectively.