

Figure 1: Schematic of various possible double-opponent receptive field configurations.

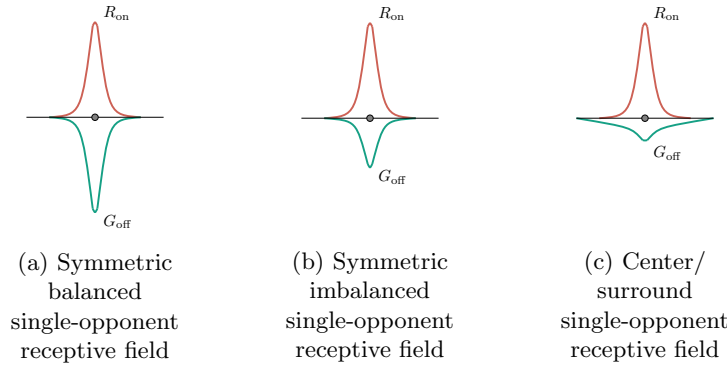


Figure 2: Schematic of various possible single-opponent receptive field configurations.

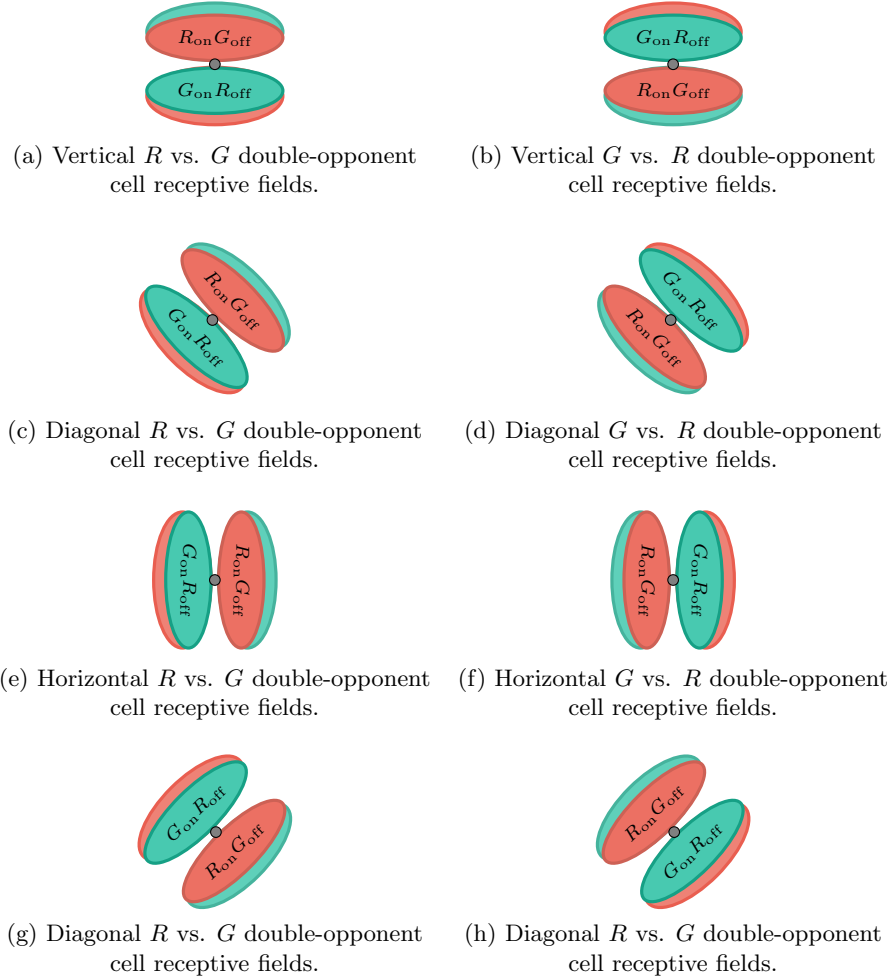


Figure 3: Schematic of orientation selectivity in double-opponent receptive field configurations. Any single double-opponent neuron only has one receptive field hard wired into it. By having collections of neurons, each selective to a different orientation at the same retinotopic location, we obtain a degree of rotation invariance.

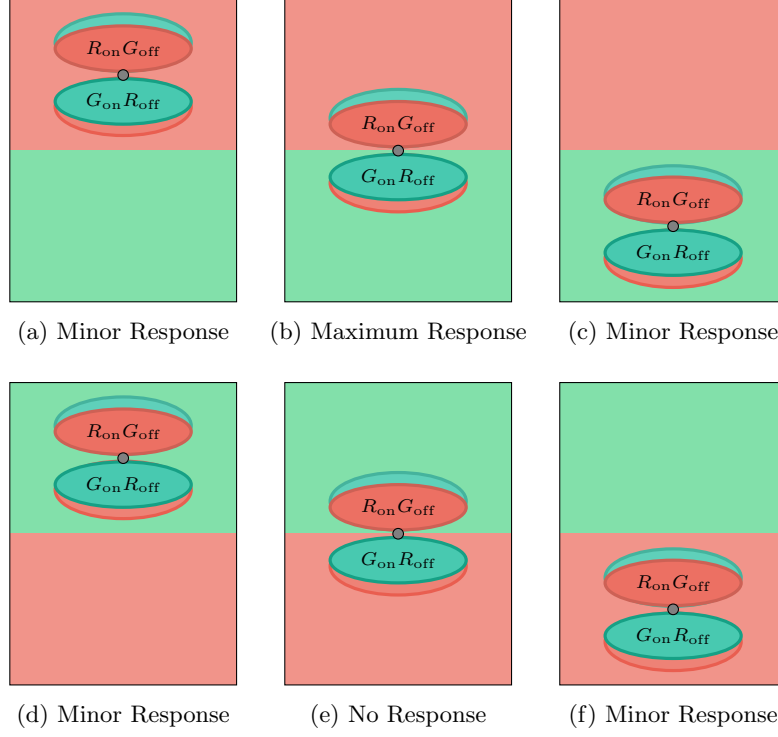


Figure 4: A double-opponent cell selective to horizontally oriented borders with red above and green below; only responsive to that particular stimulus. In Figure (b), the neuron is presented with its ideal stimulus: its  $R_{on}$  and  $G_{on}$  receptive fields are fully activated while its  $R_{off}$  and  $G_{off}$  receptive fields are completely unactivated. Figure (e) presents the neuron with the exact opposite stimulus, neither its  $R_{on}$  nor  $G_{on}$  receptive fields are activate at all, and both its  $R_{off}$  and  $G_{off}$  receptive fields are fully activated, ensuring no response possible from the cell. While its  $R_{on}$  receptive field might be strongly stimulated in (a) and (f), it's  $R_{off}$  receptive field cancels it out. Similarly, in (c) and (d) its  $G_{on}$  receptive field is stimulated but cancelled out by activity in its  $G_{off}$  receptive field.

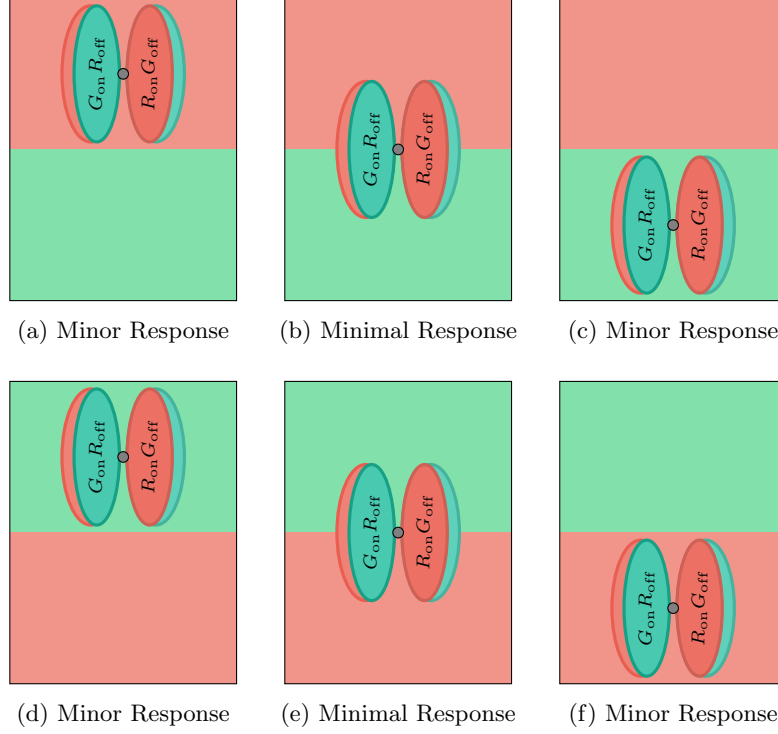


Figure 5: A double-opponent cell selective to vertically oriented borders with red to the right and green on the left; completely unresponsive to a horizontal border. While its  $R_{on}$  receptive field might be strongly stimulated in (a) and (f), its  $R_{off}$  receptive field cancels it out. Similarly, in (c) and (d) its  $G_{on}$  receptive field is stimulated but cancelled out by activity in its  $G_{off}$  receptive field. In (b) and (e) both of its  $R_{on}$  and  $G_{on}$  receptive fields are moderately activated, but again, cancelled out by activation in its  $R_{off}$  and  $G_{off}$  receptive fields, respectively.