Figure 4.6 is a schematic of how a comparator function that provides positive and negative error values might possibly be implemented with neural currents that can never be negative. (Arrowheads indicate excitation of their target, whereas circles indicate inhibition). A negative error value would result in an inhibitory output, as suggested by the top-left and bottom-right panels of the Figure.

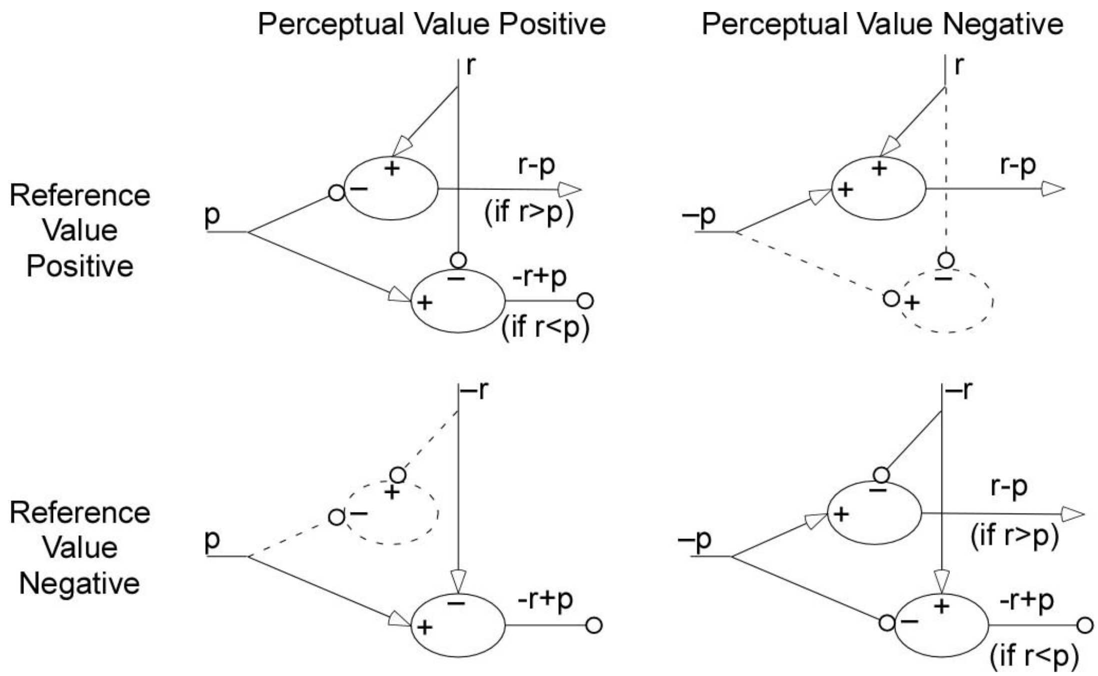

Figure 4.6 Schematic of possible implementation of a comparator. Incoming negative values are the result of inhibition or some other inversion not shown in the Figure. Four different active structures working together are required. (The perceptual value is positive in the left column, negative in the right column; the reference value is positive in the top row, negative in the bottom row). Dashed structures are indicated only so that the case is more easily compared with the cases in which r and p have the same sign.

When r and p have the same sign, sometimes one is greater, sometimes the other. Two different outputs are required for the two cases. When $r > p$, the error is positive and serves to excite the output function of the control unit, but when $r < p$, the error is negative, which we assume inhibits the output function. When $r > 0$ and $p < 0$ or the reverse, only one of the output possibilities exists. So, if this is the way in which a two-sided comparator function is implemented, six individual differencing connections are required, producing two different outputs, r-p excitatory and -r+p inhibitory.

The two outputs, one for $r-p < 0$, the other for $r-p > 0$, separately produce one-sided error values that when supplied to the output function act as though they form a single two-sided function as in Figure 4.7. The p-r pathway would present an inhibitory error value to the output function when $r<p$, while the r-p pathway would provide an excitatory input when $r>p$, as suggested in Figure 4.6c and f.