

Achromatic receptor-response function

$$F_{ab}[x_r/a] \quad x_r = \log(\text{relative luminance})$$

with $x_r = \log [L/L_u]$ (L = test luminance)

L_u = surround luminance

$$F_{ab}[x_r/a] = b \frac{e^{x_r/a} - e^{-x_r/a}}{e^{x_r/a} + e^{-x_r/a}} = b \tanh [x_r/a]$$

function values for $b=1$ and $a>0$:

$$F_{a1}[x_r/a \rightarrow -\infty] = -1 \quad x = \log L, \quad u = \log L_u$$

$$F_{a1}[x_r/a = 0] = 0 \quad x_r = \log [L/L_u]$$

$$F_{a1}[x_r/a \rightarrow +\infty] = +1 \quad = x - u$$