

Logarithmic response function of achromatic vision space T^*_{LOG3}

nonlinear color terms	name and relationship with test field luminance L	notes
threshold sum T^*_{LOG3}	$T^*_{LOG3} = A_1 \cdot \log (1 + A_2 \cdot L + A_3 \cdot L^2)$ $= A_1 \log (X)$ $X = 1 + A_2 \cdot L + A_3 \cdot L^2; \quad dX/dL = A_2 + A_3 \cdot L$	for large L : $T^*_{LOG3} = A_1 \cdot \log(A_3 \cdot L^2)$
CIE luminance contrast sensitivity threshold L / dL	$dT^*_{LOG3} / dX = A_1 \cdot X^{-1}$ $dT^*_{LOG3} / dL = dT^*_{LOG3} / dX \cdot dX / dL$ $dT^*_{LOG3} / dL = A_1 \cdot (A_2 + A_3 \cdot L) \cdot X^{-1}$ for $dT^*_{LOG3}=1$, and multiplication with L: $L / dL = L \cdot A_1 \cdot (A_2 + A_3 \cdot L) \cdot X^{-1}$ $= L \cdot A_1 (A_2 + A_3 \cdot L) / (1 + A_2 L + A_3 \cdot L^2)$	
CIE luminance difference threshold dL	$dL = X / [A_1 \cdot (A_2 + A_3 \cdot L)]$ $= (1 + A_2 \cdot L + A_3 \cdot L^2) / [A_1 (A_2 + A_3 \cdot L)]$	

for least square fit:
 $dX/dA_2 = L$
 $dX/dA_3 = L^2$
 $dX/dL = A_2 + 2A_3 \cdot L$