

## Line-element equations for thresholds and scaling

Colour-discrimination function  $f(x) = \Delta Y = \Delta x Y_u$  [0]

$$\Delta Y = 1/[(1+x)(2+x)] = 1/[1+x] - 1/[2+x] \quad x = \sqrt{2} e^{k(u-u_0)}$$

$$f_u(x) = \frac{\Delta Y}{\Delta Y_u} = \frac{1+bx}{1+b} - \frac{1+0,5bx}{1+0,5b} \quad b=1, x=Y/Y_u \quad [1]$$

$$F_u(x) = \int \frac{f'_u(x)}{f_u(x)} dx = \int \frac{b}{1+bx} dx - \int \frac{0,5b}{1+0,5bx} dx \quad [2]$$

Example for  $L^*(x)$  &  $\Delta Y$  with  $x=Y/Y_u$ ,  $x_u=1$ ,  $b=1$ :

$$L^*_u(x) = \frac{L^*(x)}{L^*(x_u)} = \frac{\ln(1+bx)}{\ln(1+b)} - \frac{\ln(1+0,5bx)}{\ln(1+0,5b)} \quad [3]$$

$$f_u(x) = \frac{\Delta Y}{\Delta Y_u} = \frac{1+bx}{1+b} - \frac{1+0,5bx}{1+0,5b} \quad [4]$$

see K. Richter (1996), Computer Graphic and Colorimetry, p. 113–127

<http://color.li.tu-berlin.de/BUA4BF.PDF>