

following relationships (e.g., Xu and Jones, 2006):

$$H = 240 - 120g/(g + b) \quad r = 0$$

$$\begin{aligned} &= 360 - 120.b/(b + r) \quad g = 0 \\ &= 120 - 120.r/(r + g) \quad b = 0 \end{aligned} \quad (1.2)$$

$$L = (R + G + B)/3 \quad (1.3)$$

$$S = [\max(R, G, B) - \min(R, G, B)] / [\max(R, G, B) + \min(R, G, B)] \quad (1.4)$$

where

$$r = R - \min(R, G, B) \quad (1.5)$$

$$g = G - \min(R, G, B) \quad (1.6)$$

$$b = B - \min(R, G, B) \quad (1.7)$$

Max (R, G, B) and min (R, G, B) represent the parameter (R, G, B) having the highest and lowest values, respectively.

With regard to a Gaussian signal (Equation 1.1, Figure 1.3a), L is an effective signal strength ($\alpha^2_0 V$), H is the dominant value of the parameter (J) and ($1 - S$) is the equivalent width (V). In color science it is the convention to form a polar diagram whereby the azimuthal angle represents H ($0-360^\circ$), the radius S ($0-1$), and the vertical axis L (Levkowitz and Herman, 1993), (Figure 1.4a). The case of $S = 1$ corresponds to an infinitely narrow (monochromatic) signal,

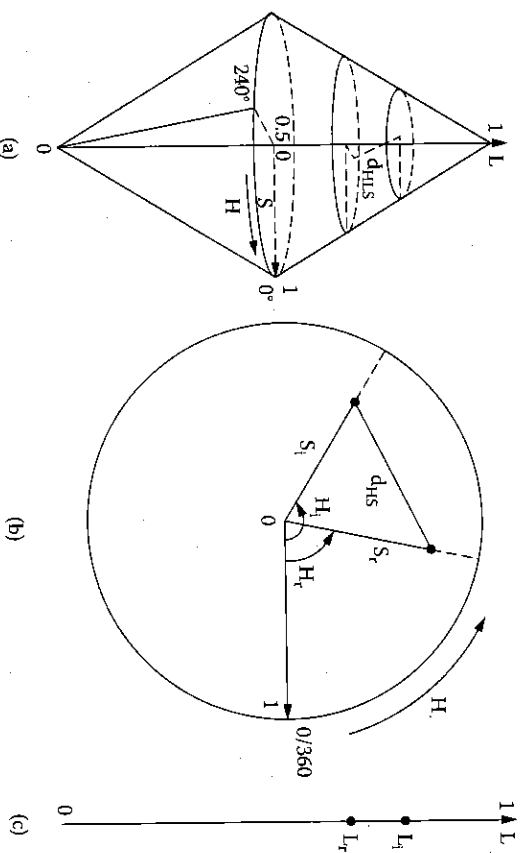


FIGURE 1.4
Changes in chromatic parameters defined on H - S and L diagrams: (a) H - L - S ; (b) H - S ; (c) L .
(From Xu, Z. and Jones, G. R. (2006), *Meas. Sci. Technol.*, 17, 3204–3211. With permission.)

whereas $S = 0$ implies a frequencies without a de to a low frequency signa

If the signal process (Figure 1.3a) but, for ex nals (Figure 1.3b), the v equivalent single Gauss nals is sufficient in the p the range $270^\circ < H < 360^\circ$ single Gaussian form (1.6)

This argument may t with the interpretation t Gaussian of a group of words, the H, L, S transf particular Gaussian gro nal processors.

This also provides an of the approach. Stergio inating between 95% d stantial color discrimin Greater discrimination sois but with little gain to be capable of discrim Consideration of such ex

1.3.2 H, L, S Adaptati

In deploying the H, L, S various adapted forms t

(a) Vector Chromatic

Overall chromatic chan crminated, as in color s and Jernigan, 1999; Dony and Jernigan, 1999; Don (Wesolkowski and Jer Euclidean distance is n

angle has smaller variat approximately zero, the tion schemes do not hav

An alternative approa to divide the H, L, S spa and a 1-D L plot (Figure the H - S and L plots ind