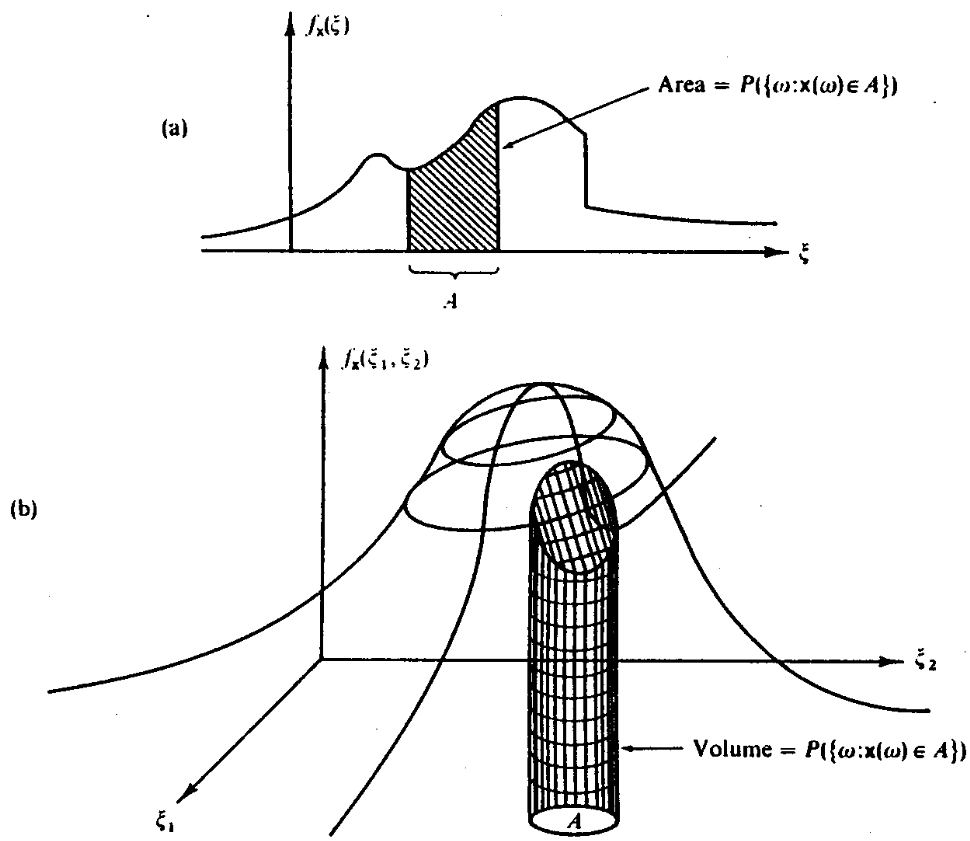


FIG. 3.10 Probability of sets. (a) Scalar-valued x. (b) Two-dimensional vector-valued **x**.

Maybeck (1979)

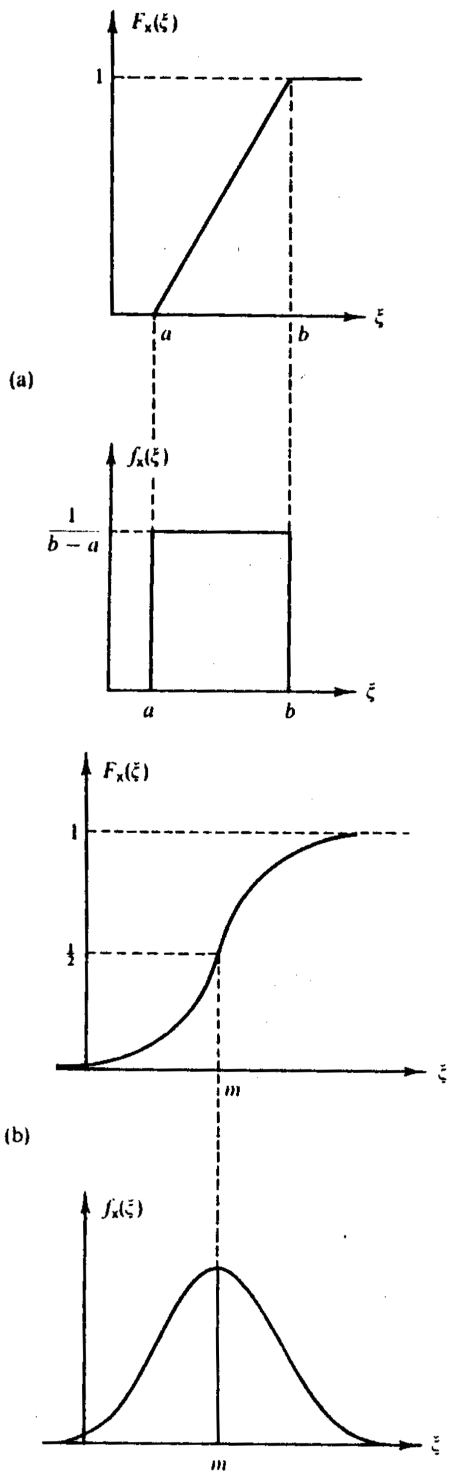


FIG. 3.9 (a) Uniform and (b) Gaussian (normal) distributions and densities.

Maybeck (1979)

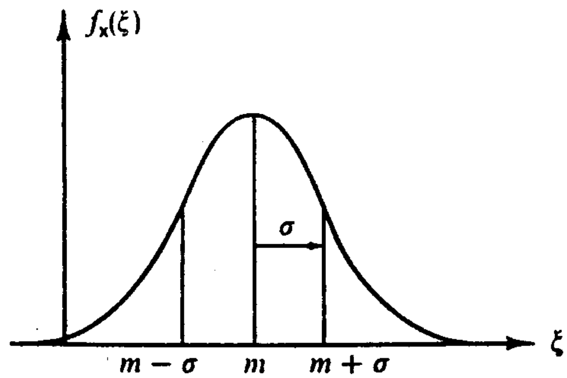


FIG. 3.18 Density function of a scalar Gaussian random variable.

Maybeck (1979)

EXAMPLE 3.18 Let x_1, x_2, and x_3 each be uniformly distributed on the interval $[0, T]$, as in Fig. 3.20a. If $y_2 = x_1 + x_2$, then y_2 has a triangular density function (verifiable by convolution) as in Fig. 3.20b, with mean T and variance $T^2/6$; also plotted is the Gaussian density function with the same first two moments. If $y_3 = x_1 + x_2 + x_3$, its density function consists of three parabolic pieces as in Fig. 3.20c, with mean $3T/2$ and variance $T^2/4$. The normal density with these same statistics is a very good approximation to the true density. ■

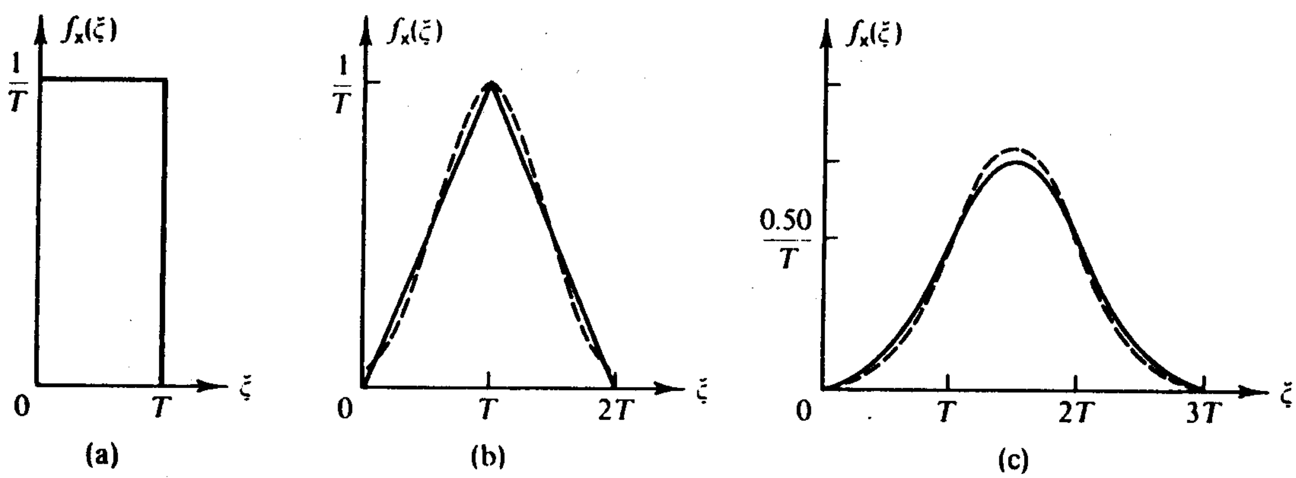


FIG. 3.20 Central limit theorem exemplified. (a) $f_{x_i}(\xi)$. (b) $x = x_1 + x_2$. Solid line indicates $f_x(\xi)$; dashed, $(1/T)\sqrt{3/\pi}\,\exp[-3(x-T)^2/T^2]$. (c) $x = x_1 + x_2 + x_3$. Solid line indicates $f_x(\xi)$; dashed, $(1/T)\sqrt{2/\pi}\,\exp[-2(x-1.5\,T)^2/T^2]$. From *Probability, Random Variables, and Stochastic Processes* by A. Papoulis. © 1965. Used with permission of McGraw-Hill Book Co.

Maybeck (1979)

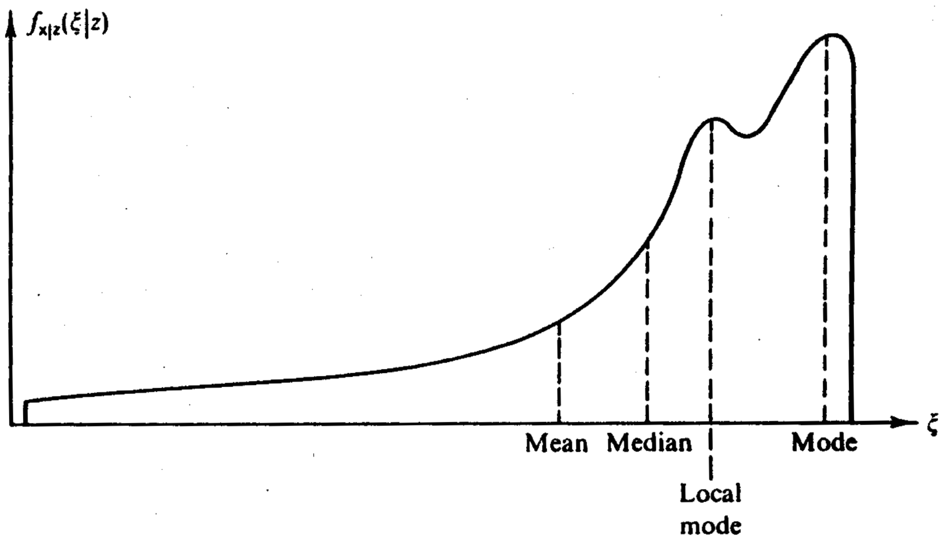


FIG. 3.21 Choice of estimator.

Maybeck (1979)

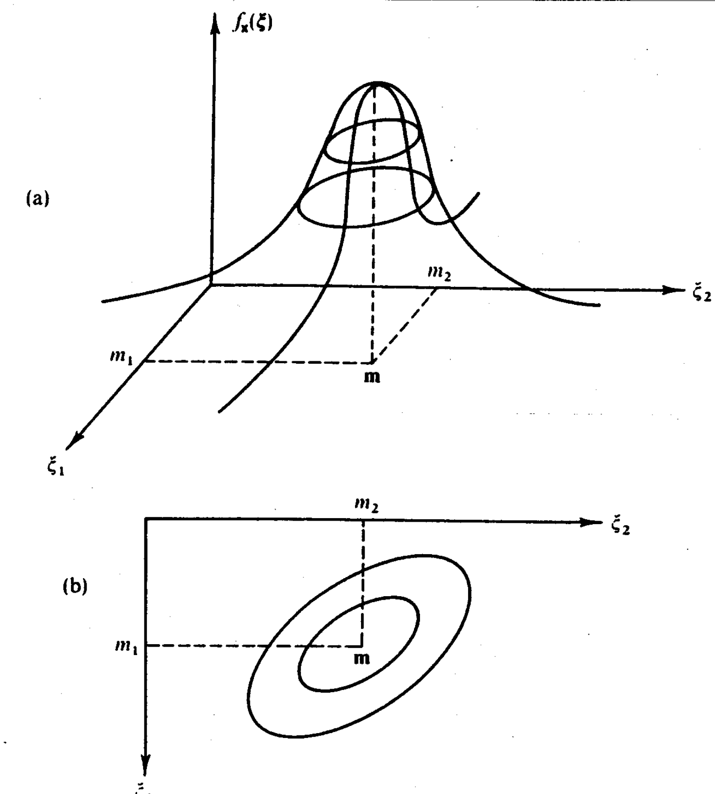
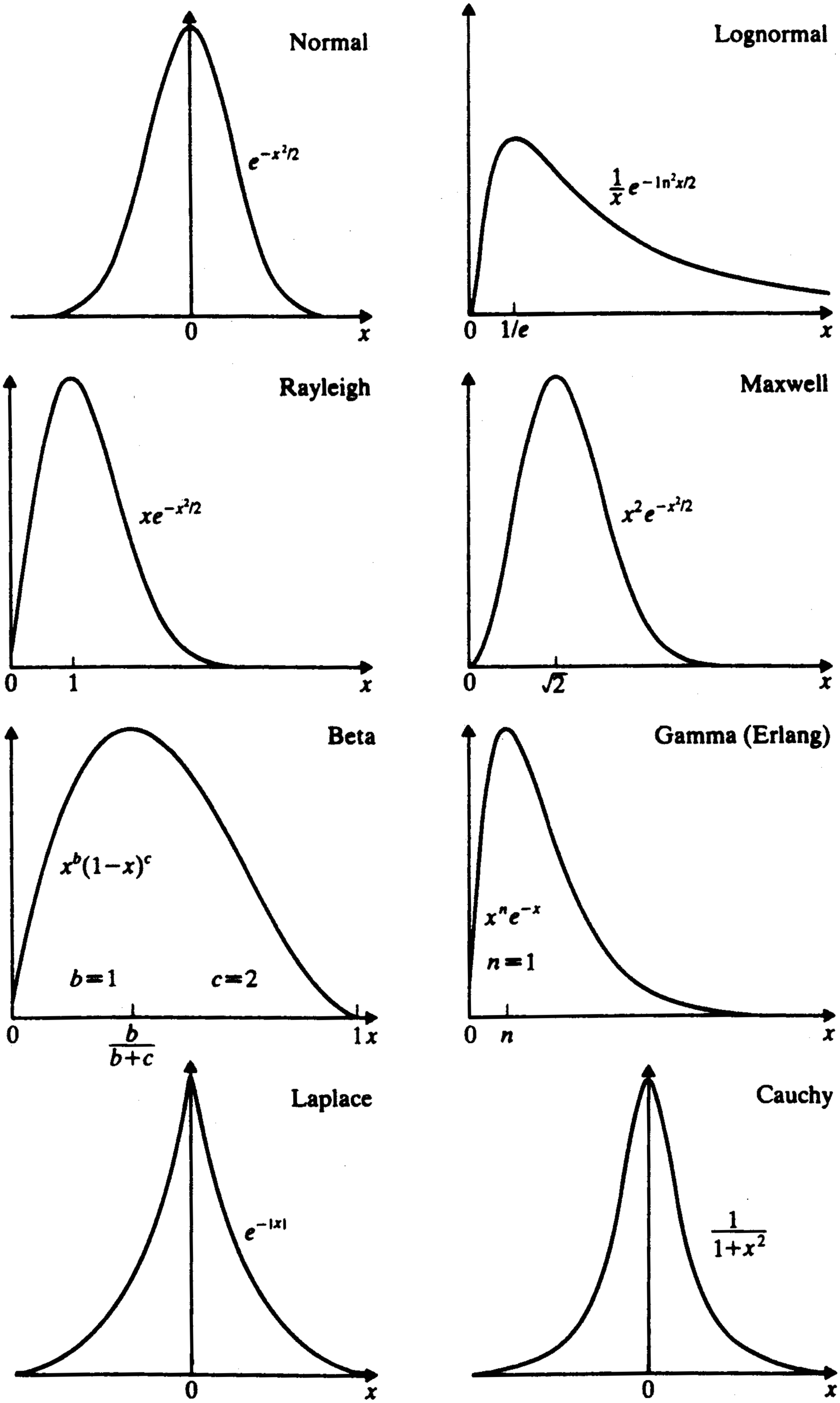


FIG. 3.19 Density function for a two-dimensional Gaussian random vector. (a) Three-dimensional depiction. (b) View from above. The ellipses are the loci of constant probability density value.

Maybeck (1979)



Papoulis (1965)

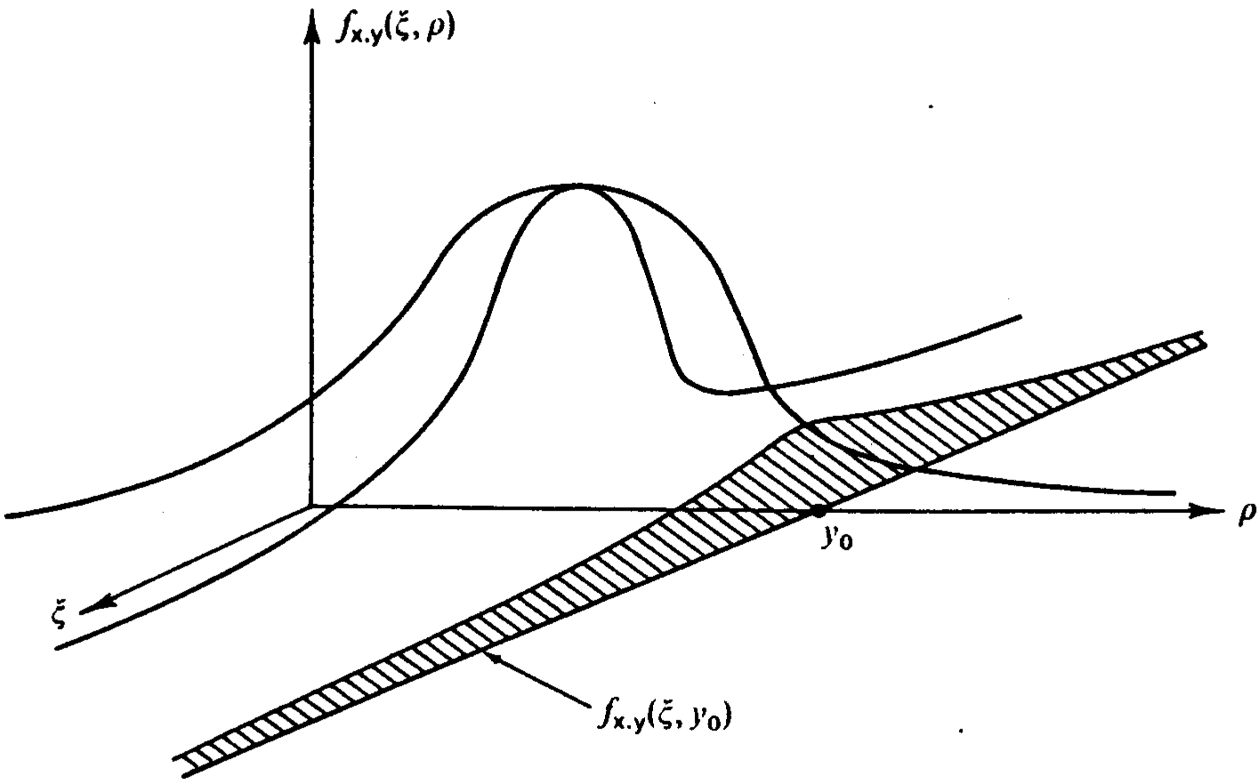


FIG. 3.13 Generation of conditional density.

Maybeck (1979)

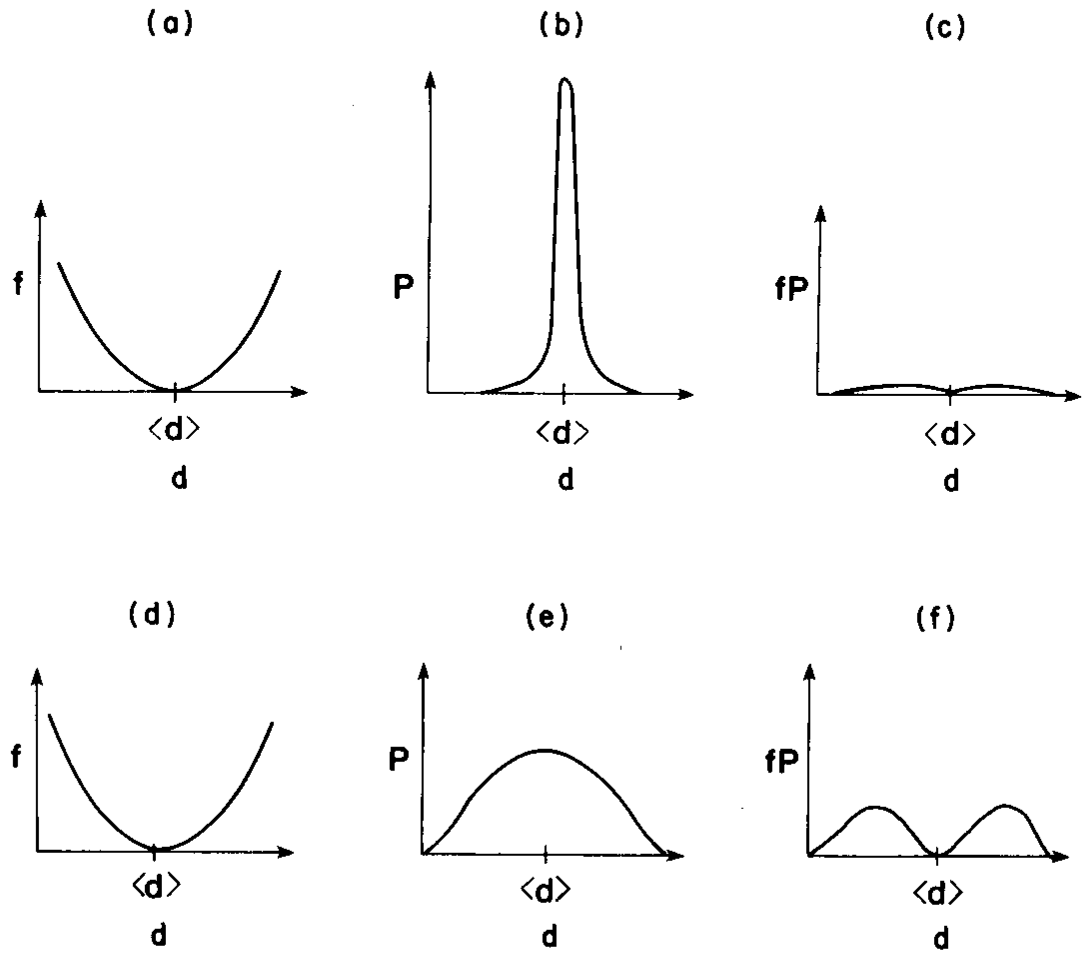


Fig. 2.4. (a and d) A parabola of the form $f = [d - \langle d \rangle]^2$ is used to measure the width of two probability distributions P (b and e) which have the same mean but different widths. The product fP is everywhere small for the narrow distribution (c) but has two large peaks for the wider distribution (f). The area under fP is a measure of the width of the distribution, and is called the variance.

Menke (1989)

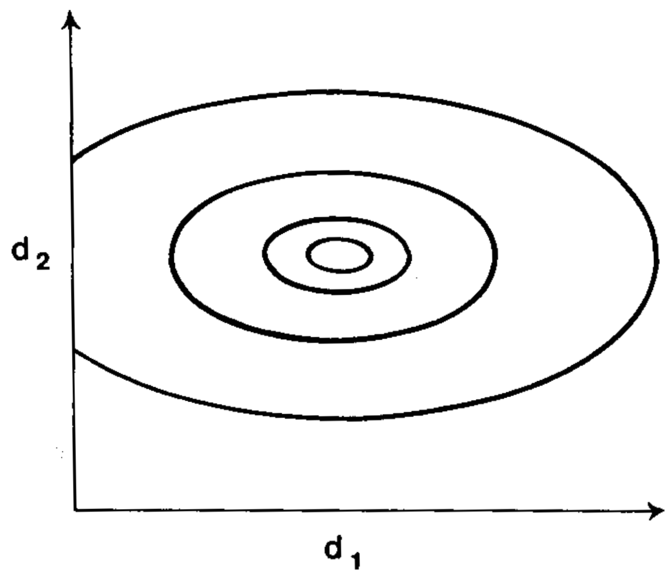


Fig. 2.5. The probability distribution $P(d_1, d_2)$ is contoured as a function of d_1 and d_2. These data are uncorrelated, since especially large values of d_2 are no more or less likely if d_1 is large or small.

Menke (1989)

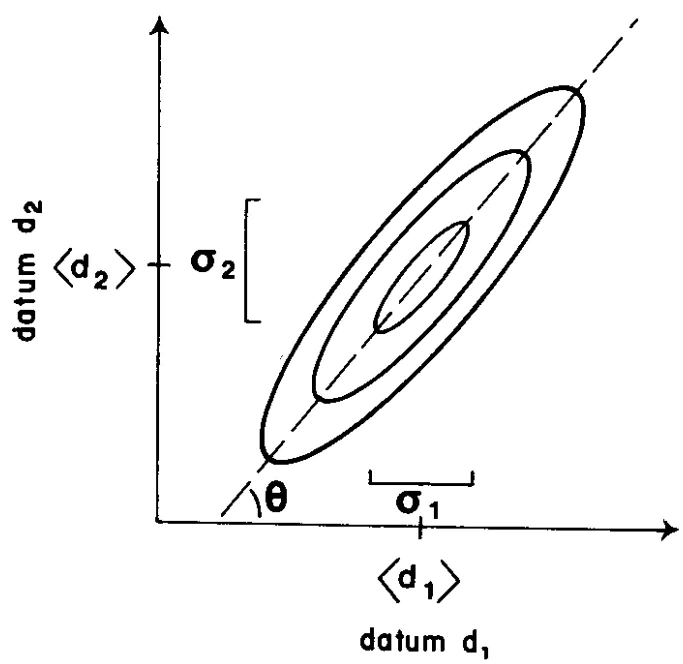


Fig. 2.6. The probability distribution $P(d_1, d_2)$ is contoured as a function of d_1 and d_2. These data are correlated, since large values of d_2 are especially probable if d_1 is large. The distribution has mean values $\langle d_1 \rangle$ and $\langle d_2 \rangle$ and widths in the coordinate directions given by σ_1 and σ_2. The angle Θ is a measure of the correlation and is related to the covariance.

Menke (1989)

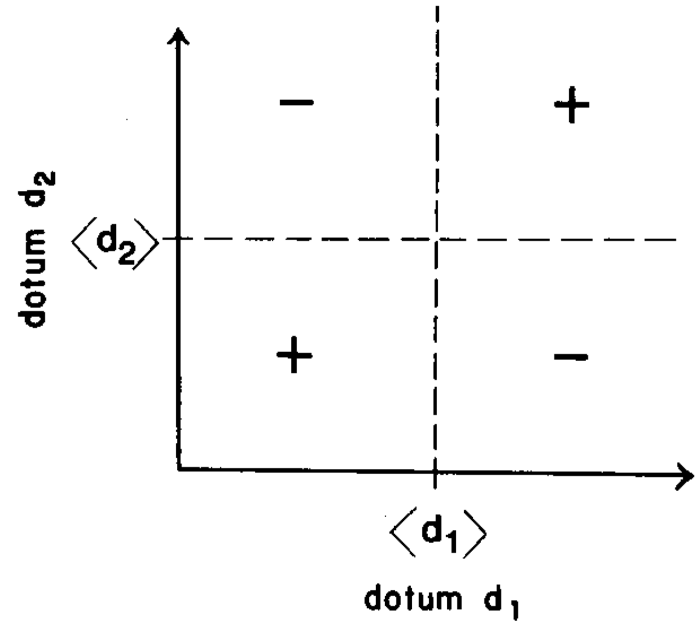


Fig. 2.7. The function $(d_1 - \langle d_1 \rangle)(d_2 - \langle d_2 \rangle)$ divides the (d_1, d_2) plane into four quadrants of alternating sign.

Menke (1989)

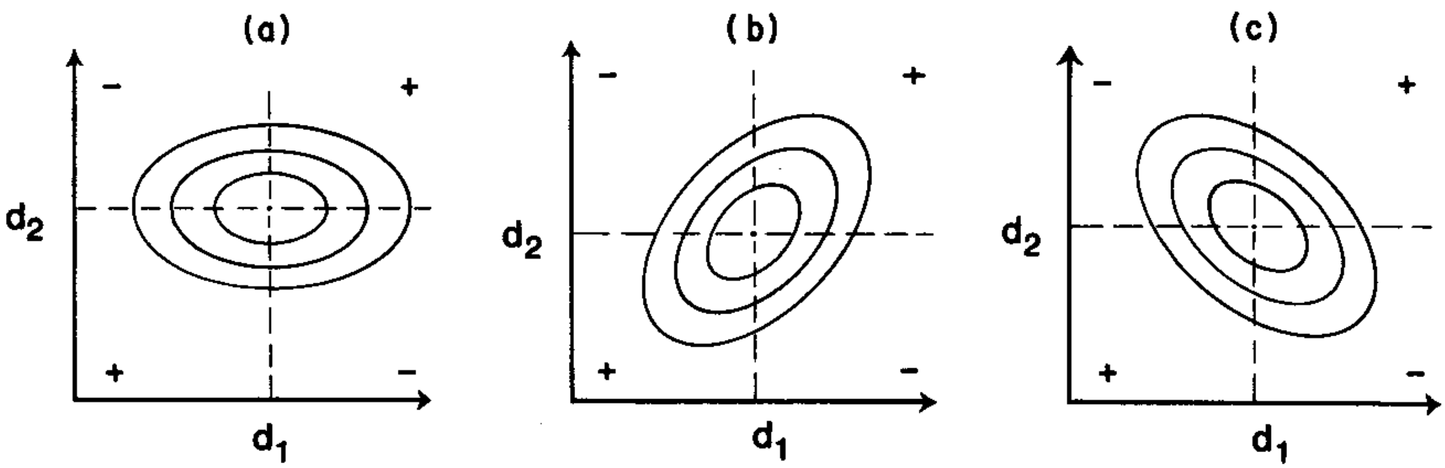


Fig. 2.8. Contour plots of $P(d_1, d_2)$ when the data are (a) uncorrelated, (b) positively correlated, (c) negatively correlated. The dashed lines indicate the four quadrants of alternating sign used to determine correlation (see Fig. 2.7).

Menke (1989)

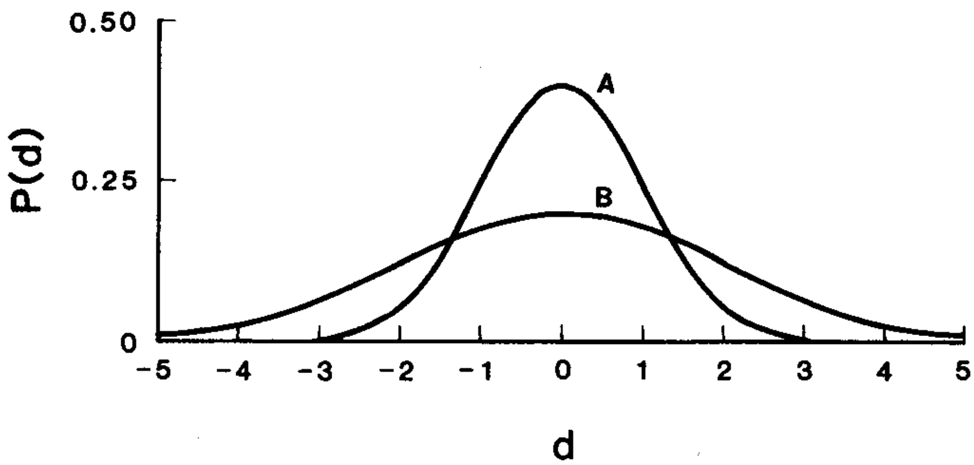


Fig. 2.10. Gaussian distribution with zero mean and $\sigma = 1$ for curve A, and $\sigma = 2$ for curve B.

Menke (1989)