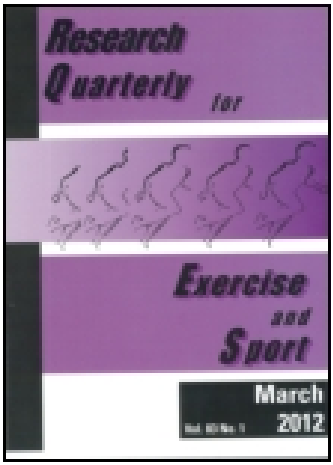

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A Somatotype Dispersion Index

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COMMUNICATIONS

A SOMATOTYPE DISPERSION INDEX

William D. Ross and Barry D. Wilson

THE PROBLEM OF classification of human shape has intrigued scientists for centuries. Martin and Saller (5) present a table listing 38 physique classification systems starting with Hippocrates. For the past 30 years, the somatotype system originated by Sheldon *et al.* (6) has had widespread use. Contemporarily, a modified method by Heath and Carter (3) has been favored, particularly in the study of sport champions and participants (1).

The Sheldonian and Heath-Carter systems are different and ratings are not interchangeable. However, both use a similar nomenclature for displaying sample distributions of somatotypes on a triangular shaped somatochart.

As discussed by Carter (2) and Hebbelinck and Ross (4) an (X, Y) coordinate grid may be superimposed over a somatochart of Carter's design as shown in Figure 1. Individual somatotype (X, Y) coordinate plotting points on somatoplots may be obtained from the following formulas:

$$X = III - I \tag{1}$$

$$Y = 2II - (I + III) \tag{2}$$

where

I is the rating of the first component, endomorphy
II is the rating of the second component, mesomorphy
III is the rating of the third component, ectomorphy

Somatotype Dispersion Distance

The distance between any somatoplots (X_1, Y_1) and (X_2, Y_2) may be compared directly by a calculated somatotype dispersion distance (SDD) as follows:

$$SDD = \sqrt{(kX_1 - kX_2)^2 + (Y_1 - Y_2)^2} \tag{3}$$

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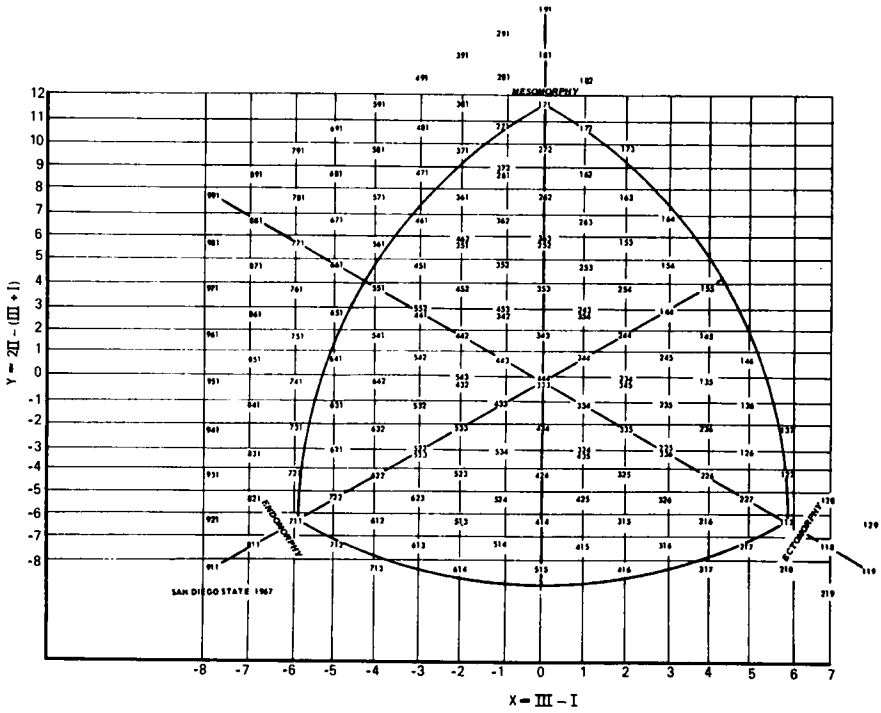

Figure 1. X, Y coordinate grid superimposed over a somatochart of Carter's design.

where *SDD* is the somatotype dispersion distance expressed in *Y* units:

$k = 1.732$, the factor that converts *X* values to *Y* units

(X_1, Y_1) are coordinates of one somatoplot

(X_2, Y_2) are coordinates of the other somatoplot

For example, the *SDD* between somatotypes 3–5–3 and 2–4–4 would be obtained as follows. Let (X_1, Y_1) and (X_2, Y_2) represent the somatoplots of 3–5–3 and 2–4–4, respectively. By formulas (1) and (2), coordinates $(X_1, Y_1) = (0, 4)$ and $(X_2, Y_2) = (2, 2)$. The *SDD* between the two somatoplots may be obtained by substituting these values in formula (3) to yield a value of 1.86, which is the actual distance on the somatochart expressed in dispersion units.

Somatotype Dispersion Index

A somatotype dispersion index (*SDI*) is simply the mean of the somatotype dispersal distances for each somatoplot about the somatoplot for the calculated mean somatotype of a distribution. For example, if we had a sample distribution of somatotypes 3–5–2 (−1, 5), 2–6–3 (1, 7), 2–5–4 (2, 4), 3–4–4 (1, 1),

3–5–4 (1, 3) the calculated mean somatotype is 2.6–5.0–3.4. The coordinates of this mean somatoplot by formulas (1) and (2) are (0.8, 4.0). The individual *SDD's* from this mean somatoplot are, respectively, 3.27, 3.02, 2.08, 3.02, 1.06. The sum of these values divided by five (n) yields a *SDI* of 2.49.

Application of SDD and SDI

The *SDD* may be used whenever it is meaningful to quantify somatochart distance between somatoplots. In longitudinal study, for example, using the *SDD* one can express change in terms of distance as well as direction.

The *SDI* is a descriptive statistic of a sample. In much the same way as a standard deviation expresses the relative dispersion about a mean value in a distribution of scores, the *SDI* serves to describe dispersion about a mean somatoplot. Indeed, the size of the dispersion of somatotypes in samples is often of primary concern in studies related to growth and development, performance, exercise, and nutrition.

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