

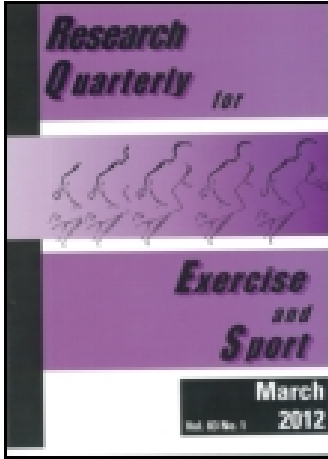
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### A Somatotype Dispersion Index

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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 somatypes on a triangular shaped somatochart.

As discussed by Carter (2) and Hebbelink 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:

$$X = III - I \quad (1)$$

$$Y = 2II - (I + III) \quad (2)$$

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:

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

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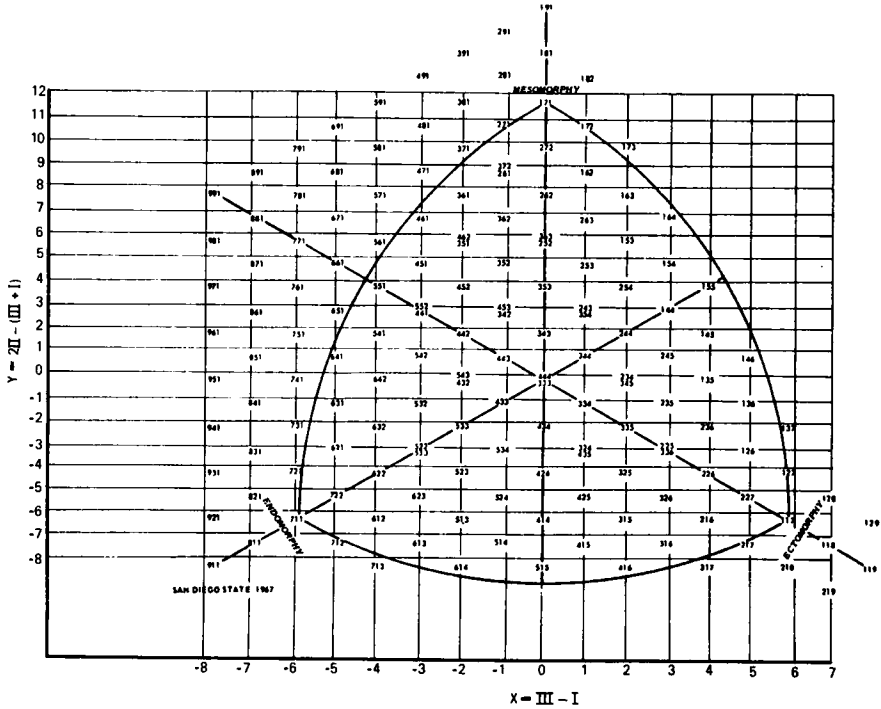


Figure 1. X, Y coordinate grid superimposed over a somatochart of Carter's design.

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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