

Concerning Biometrics and Psychometrics

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We compare developments of statistical theory in Psychometrics and Biometrics. Starting from a common basis, founded in the Gauss linear model and the Galton/Pearson biometric concern with the regression and correlational properties of the multinormal distribution, the two began to diverge at the beginning of the 20th century. The impetus came from the foundation of factor analysis (Spearman, Thomson, Thurstone and Burt), followed by Fisher's developments arising from genetical and agricultural research. Much has depended on the types of measurement concerned: originally errors of measurement, followed by a recognition of natural biological variation and, in psychology, the difficulty of making any direct measurement of intelligence or other variables of interest.

Special attention will be paid to differences in (1) treatment of linear models; (2) definitions and usage of interaction as additive, multiplicative or distance terms, (3) transformations of data, (4) data structures, (5) the possibilities of randomisation and sampling (especially observational versus experimental data); (6) the use of correlation, distance, (dis)similarity, and inner-products; and (7) treatment of categorical variables, rank-order data, paired comparisons and latent variables.

We think each area can gain from the work of the other. There are signs that this is already happening but, perhaps, not enough.