## 88. On the distribution of Fisher's taxonomic coefficient.

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In a paper published lately in the Annals of Eugenics (Vol. VII, Part II, September 1936, pp. 178–188) under the title 'The Use of Multiple Measurements in Taxonomic Problems' R. A. Fisher has obtained by the principle of maximization a certain expression based on sample readings, which he calls the taxonomic coefficient whose object is to test, on the hypothesis of a multivariate normal population, whether two samples can be reasonably supposed to have been drawn from two populations with the same means, it being known or assumed that the two populations have the same variances and co-variances. By certain general arguments and formal analogies with partial regression Fisher makes the distribution of this coefficient depend on his $z$-distribution, and then proceeds to numerical applications. The present paper makes use of hyperspace geometry and the rectangular co-ordinates developed earlier by the authors ('Normalization of Variates and the Use of Rectangular Co-ordinates in the Theory of Sampling Distributions' Sankhyā, Vol. 3, Part 1, 1937, pp. 1–40) to derive in full the sampling distribution of this coefficient. It is shown in conclusion that this is in entire agreement with the distribution supposed to be behind Fisher's numerical applications but not explicitly given in the Annals of Eugenics paper. The distribution of the coefficient, when the hypothesis tested is not true, is being worked out.