

PROBABILITY AND STATISTICS IN PSYCHOMETRIC RESEARCH: ITEM ANALYSIS AND CLASSIFICA- TION TECHNIQUES

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1. Introduction

As in other disciplines, statistics and probability have a strong impact on the growth and development of the psychological sciences; and the substantive problems of the psychological sciences, in turn, are instrumental in the growth and development of concepts and methodology in statistics and probability. Moreover, this relationship now also exists, to a much smaller degree, between other mathematical disciplines and the psychological sciences. This marriage of the two subjects has certainly been a legitimate affair since Galton's genius operated in the second half of the nineteenth century.

Probability continually looms as an important tool for measurement problems in psychology, and statistics does its share once a probabilistic model has been formulated. This paper was sandwiched between two others¹ whose titles illustrate this point very well. In the previous paper by Mosteller you were invited to look at recent thinking in probabilistic models in learning theory and some of the statistical problems connected with the estimation of the parameters of the models. If I may assume one of the prerogatives of the statistician, I should like to "predict" that you will be treated to a similar repast in the paper by Anderson in connection with "common factor" factor analytic models, one of the earliest attempts at measurement of mental ability. However, the important point to be brought out by the comparison is that in the old sometimes maligned model discussed by Anderson only questions of inference for parameters of the model are analyzed in a statistically sophisticated manner with not much attention to the validity of the model; while in Mosteller's discussion of a rather new measurement device in learning theory the emphasis is on the validity of the model.

At this point one might add a trite statement, namely, that the statistician or probabilist should work closely with the psychologist so that the inference machinery of the statistician, the tools of the probabilist, and the imagination and experience of the psychologist can be jointly brought to bear on the simultaneous construction of both a valid model and the inference devices necessary to demonstrate that the model is tenable on the basis of sample observations. However, who is to determine whether the stat-

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¹ At the Symposium, this paper followed the paper by Mosteller and preceded the one by Anderson.