ON GENERALIZATION OF THE ANALYSIS OF VARIANCE

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Abstract. The standard analysis of variance procedures were developed and organized primarily in the context of the normal linear model; central to this organization is the orthogonality of components and the use of orthogonal projections. This paper examines two model-type generalizations of the normal linear model: the regression model with nonnormal error and the exponential linear model. Principles of conditioning and measurement are used to develop corresponding analysis-of-variance procedures. In each case a linear fibre or foliation structure replaces orthogonality; however, for the intersection of the two model-types, which is the normal linear model, the two quite-different fibre-foliation structures reduce to a product space structure, which with the appropriate inner product, is the usual orthogonality. For implementation, conditional-marginal densities are involved, the marginalization aspect being the restricting aspect: the marginalization degree is the number of nuisance parameters for the regression model-type and is the complement of the number of free parameters for the exponential model-type. Approximations are available and will be discussed subsequently.

Key words and phrases: Analysis-of-variance, exponential model, transformation model, sequential parameter structure.