

# 中央研究院統計科學研究所

## 學術演講

講題：Modeling of covariance matrix in linear models for multivariate longitudinal data

演講人：Prof. Keunbaik Lee

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時間：2019年1月30日（星期三）下午14:00-15:30

地點：中央研究院統計科學研究所6005會議室(環境變遷研究大樓A棟)

※茶會：下午15:30開始

### Abstract

Linear models are typically used to analyze multivariate longitudinal data. In these models, estimating the covariance matrix is not easy because the covariance matrix should account for complex correlated structures: the correlation between responses at each time point, the correlation within separate responses over time and the cross-correlation between different responses at different times. In addition, the estimated covariance matrix should satisfy the positive definiteness condition, and the covariance matrix may be heteroscedastic.

However, in practice, the structure of the covariance matrix is assumed to be homoscedastic and restricted, such as exchangeable or autoregressive with order one. These assumptions are too strong and result in biased estimates of the estimated effects of covariates.

Several studies have been carried out to solve these restrictions using modified Cholesky decomposition and linear covariance models. However, modeling the correlation between responses at each time point is not easy because there is no natural ordering of the responses. In this paper, we use modified Cholesky decomposition and hypersphere decomposition to model the complex correlation structures for multivariate longitudinal data. We note that the estimated covariance matrix using the decompositions is positive definite and can be heteroscedastic. It is also interpretable. The proposed methods are illustrated using data from a nonalcoholic fatty liver disease study.

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