

**University of California, Irvine
Statistics Seminar**

***Defining Coefficients of Determination
Beyond Linear Regression***

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Join via Zoom: <https://tinyurl.com/4azdp5zh>**

The coefficient of determination, a.k.a. R-squared, is well-defined for linear regression models and measures the proportion of variation in the dependent variable modeled by available predictors. Although it defines heritability in genetics, its definition for nongaussian models is debatable, challenged by heteroscedasticity. We propose defining the variation of a dependent variable along its variance function to accommodate heteroscedasticity and accordingly defining R-squared. Unlike other extensions that demand complete specification of the likelihood function, our definition only needs to know the mean and variance functions, so applicable to more general quasi-models. For generalized linear mixed models, we similarly define measures to quantify proportions of variation explained by the whole model, fixed components only, and random components only. These coefficients of determination are consistent with the traditional measures of uncertainty using variance, and reduce to the traditional definition of the coefficients of determination when Gaussian models are considered.