

# TWO EXTENSIONS OF EXTENDED REDUNDANCY ANALYSIS FOR EXPLORATORY DATA ANALYSIS

Naoto Yamashita<sup>1</sup>

<sup>1</sup> Department of Sociology, Kansai University,  
(e-mail: nyam@kansai-u.ac.jp)

**ABSTRACT:** A multivariate analysis procedure called Extended Redundancy Analysis (ERA) regresses dependent variable(s) on component scores that are determined as weighted sums of independent variables. ERA requires knowledge of group structures of the independent variables, which is often not available in real-world problems. This research proposes a new exploratory variant of ERA called Exploratory ERA (ExERA) is proposed. ExERA does not require the group structure but instead estimates the optimal structure using the dataset. ExERA can also be divided into two different procedures according to their methodology, ExERA-Sp and ExERA-R. ExERA-Sp estimates the group structure of independent variables by sparsely estimating the weight matrix under the constraint that the weight matrix has a perfect cluster structure. ExERA-R approximates a similar structure obtained using ExERA-Sp and obliquely rotating the weight matrix. Numerical simulations and a real data example were used to investigate how well the two approaches performed and to demonstrate the validity of the proposed procedures for exploratory data analysis.

**KEYWORDS:** Redundancy analysis, oblique rotation, sparse estimation, exploratory data analysis