



**17th Annual ENBIS Conference**

**Naples, 9-14 September 2017**

**Programme and Abstracts**

# ENBIS-17 PROGRAMME AND ABSTRACTS

Programme and abstracts of the 17th Annual Conference of the European Network for Business and Industrial Statistics (ENBIS)

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a dozen such measures including the relative linkage disequilibrium (RLD) which normalises classical Euclidean distances of the itemset from a surface of independence. Because an AR can be expressed as a contingency table it is an element of the simplex, the sample space of the compositional data (CoDa). It is well known that CoDa methodology provides nice properties such as subcompositional coherence and scalability. In this work we explore the contributions of CoDa methods to AR mining in big data analysis. The talk will focus on such aspects, including the dynamic visualization of CoDa-AR measures on a simplex representation of the itemsets and its multidimensional extension using log-ratio coordinates.

## **Tuesday 09:20–09:40, Analysing Ordered Categorical Data with the Generalized Taguchi’s Statistic**

**Contributed Session: Categorical Data, Room: Room B**

*Pietro Amenta* (Department of Law, Economics, Management and Quantitative Methods, University of Sannio), *Luigi D’Ambra* (Department of Economics, Management and Institutions, University of Naples), *Antonello D’Ambra* (Department of Economics, University of Campania “Luigi Vanvitelli”) and *Anna Crisci* (Department of Low and Economic Sciences, Pegaso Telematic University)

**Keywords:** Ordered categorical data, Taguchi’s statistic, Data mining, Quantification process, Logistic model

In industrial experiments for quality improvement the output consists often of categorical data with a clear ordering in the categories. This is due to the inherent nature of quality characteristic or to the convenience of the measurement technique. A well-known example of this occurrence is the study of a polysilicon deposition process by Phadke (1989). Several techniques have been proposed for the analysis of ordered categorical data for quality improvement in industrial settings. We remind the proposals of Taguchi (1974), Nair (1986), Jeng & Guo (1996), Asiabar & Ghomi (2006), and Wu & Yeh (2006).

A generalization of the Taguchi’s statistic, measuring the association between a nominal explanatory and an ordered categorical response variable is here proposed for analysing ordered categorical data in quality engineering. This new measure, based also on quantification process for the ordered categories, is named “Generalized Cumulative Chi-Squared Statistic” (GCCS) and a class of GCCS-type tests is also introduced. GCCS allows a graphical investigation of the optimal combination by considering the ordinal nature of the variable as well as in the quantification process of the ordered categories. We highlight that including the quantification process within the analysis is often an overlooked aspect in statistical literature.

An empirical study from industrial experiments for quality improvement has been developed. This study has been performed on a strategy based on the conjoint use of the Generalized Taguchi’s statistic and the Logistic Model. It allows to obtain an optimal combination of factors highlighting the levels to improve process quality.