



KATHOLIEKE UNIVERSITEIT LEUVEN

Statistics Seminar

Joint organization by
ORSTAT, Faculty of Business and Economics and the statistics research group,
Faculty of Science
Leuven Statistics Research Center

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“Semiparametric tests for statistical and sufficient cause interactions”

Thursday May 27, 2010
12:00—13:00

Location: Room HOG 03.101, Naamsestraat 69, Leuven.

Supporting research project: GOA-project 2007/04

Abstract:

A primary focus of an increasing number of scientific studies is to determine whether two exposures interact in the effect that they produce on an outcome of interest. Interaction is commonly assessed by fitting regression models in which the linear predictor includes the product between those exposures. When the main interest lies in the interaction, this approach is not entirely satisfactory because it is prone to (possibly severe) bias when the main exposure effects or the association between outcome and extraneous factors are misspecified. In this talk, I we therefore consider conditional mean models with identity or log link which postulate the statistical interaction in terms of a finite-dimensional parameter, but which are otherwise unspecified. We show that estimation of the interaction parameter is generally not feasible because it requires the auxiliary estimation of conditional expectations given high-dimensional variables. We thus consider ‘multiply robust estimation’ under a union model that assumes at least one of several working models holds. In the special case of a randomized trial or a family-based genetic study in which the joint exposure distribution is known by design or by Mendelian inheritance, the resulting multiply robust procedure leads to asymptotically distribution-free tests of the null hypothesis of no interaction on an additive scale. We extend the results to the detection of so-called sufficient cause interactions between two exposures, which signals the presence of individuals for whom the outcome would occur only under certain values of the two exposures. We illustrate the methods via simulation and the analysis of a randomized follow-up study.